SPECIAL OPERATIONS SNIPER TRAINING AND EMPLOYMENT

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Chapter 1

THE SPECIAL OPERATIONS SNIPER

1-1. PURPOSE

The purpose of this manual is to provide doctrinal guidance on the mission, selection of personnel, organization, equipment, training, skills, and employment of the Special Operations Sniper.

1-2. SCOPE

This manual addresses three distinct audiences:

o The commander. This manual provides specific guidance on the nature, role, candidate selection, organization, and employment of sniper personnel.

o The trainer. This manual provides a reference for the development of training programs.

o The sniper. This manual contains detailed information on the fundamental knowledge, skills, and employment methods of snipers throughout the entire Operational Continuum.

This manual describes those segments of sniping that are unique to Special Operations Forces (SOF). It also describes those portions of conventional sniping that are necessary to train indigenous forces.

1-3. GENERAL

The Special Operations (SO) sniper is a selected volunteer specially trained in advanced marksmanship and fieldcraft skills who can engage selected targets from concealed positions at ranges and under conditions that are not possible for the normal rifleman, in support of Special Operations Forces (SOF) missions.

1-4. MISSION

Nature of Special Operations.

SO are actions conducted by specially organized, trained, and equipped military and paramilitary forces to achieve military, political, economic, or psychological objectives by nonconventional means in hostile, denied, or politically sensitive areas. They are conducted in peace, conflict, and war, independently or in coordination with operations of conventional forces. Politico-military considerations frequently shape SO, requiring clandestine,

covert or low-visibility techniques, and oversight at the national level. SO usually differ from conventional operations in their degree of risk, operational techniques, mode of employment, independence from friendly support, and dependence upon operational intelligence and indigenous assets.

Public law (10 USC 167) states that SO activities include the following as far as they relate to SO:

- Direct action (DA).
- Strategic reconnaissance, which the US Special Operations Command (USSOCOM) has incorporated into a broader activity called special reconnaissance (SR).
- Unconventional warfare (UW).
- Foreign internal defense (FID).
- Civil affairs (CA).
- Psychological operations (PSYOP).
- Counterterrorism (CT).
- Humanitarian assistance (HA).
- Theater search and rescue (SAR).
- Such other activities as may be specified by the National Command Authorities (NCA).

SOF are those forces specifically organized, trained, and equipped to conduct SO activities or provide direct support (DS) to other SOF. They provide a versatile military capability to defend US national interests. They are an integral part of the total defense posture of the United States and a strategic instrument of national policy. These forces serve as force multipliers. They can function in an economy of force role to provide substantial leverage at a reasonable cost and effort. SOF thus provide military options for national response that can stabilize an international situation with minimum risk to US interests.

The SO sniper will normally be employed to conduct:

Unconventional Warfare (UW).

Foreign Internal Defense (FID).

Direct Action (DA).

Special Reconnaissance (SR).

Counter Terrorism (CT).

During peacetime, SO snipers may also be used to:

Assist foreign governments.

Train foreign military snipers.

Conduct counterterrorism operations.

Safeguard US citizens and property abroad.

Conduct recovery operations.

Conduct deception operations.

Conduct show of force operations.

Conduct rescue operations.

Conduct operations that support the National Command Authority's (NCA) strategic goals.

The SO sniper supports these missions with the following:

Engaging long-range targets with precision fire.

Obtaining and reporting enemy intelligence information.

1-5. SELECTION OF PERSONNEL

The purpose of this section is to establish doctrinal guidelines for the selection and assessment of SOF sniper candidates. It is critically important for the commander to monitor evaluation and selection procedures, since each unit may have a different mission. There are no absolutes for the selection of SOF snipers; however, there are diagnostic tests, organizational indicators, and trends that will serve to assist the commander in identifying potential snipers.

Candidates for sniper training must be carefully screened. The rigorous training program and the great personal risk in combat require high motivation and the ability to learn a variety of skills. The proper mental conditioning cannot always be taught or instilled by training.

Many well-disciplined individuals can rapidly compose themselves after a fleeting surrender to excitement, fear, or indecisiveness. In the sniper's profession an instant of uncontrolled emotion can be fatal. The sniper must possess true

emotional balance, a perpetual self-possession, and serenity developed from maturity and patience. The hunter who experiences "buck-fever" may lose the deer; the sniper who cannot control his emotions may lose his life.

The sniper must be capable of calmly and deliberately killing targets that may not pose an immediate threat to him. It is much easier to kill in self-defense or in the defense of others than it is to kill without apparent provocation. The sniper must not be susceptible to emotions such as anxiety or remorse. Candidates whose motivation toward sniper training rests mainly in the desire for the prestige from serving in a unique role may not be capable of the cold rationality that the sniper's job requires. To kill in this fashion requires mental discipline and the belief in the rightness and moral correctness of the mission. The sniper must be able to live with himself afterward, sorting out his feelings of right and wrong, without carrying disabling emotional baggage.

Diagnostic and aptitude testing may be implemented at the discretion of the commander. Certain testing procedures may be quite lengthy and tedious and are therefore subject to limitations of time, equipment, and facilities. It is recommended, however, that psychological evaluation of a candidate be at least partially determined through the use of the Minnesota Multi-Phasic Personality Inventory (MMPI). This test, if properly administered, gives the commander a personality profile of the individual. It can assist the commander in evaluating whether the candidate can function in confined spaces, can work independently, and has the potential to function as a sniper.

The tests are more than simple mental analyses. Psychological screening establishes a profile of characteristics that indicate if an individual would be a successful sniper. Testing eliminates candidates who would not perform well in combat. In the past, some trained snipers have refused to shoot targets that were not a direct threat to them, or, after shooting an enemy, refused to shoot again. Psychological screening is intended to identify individuals who would have these problems.

Other tests that may be used by the commander are:

o The California Psychological Inventory. This test measures normality traits that can enhance or inhibit the ability to accomplish a given mission. Specifically, it measures self-confidence, achievement potential, motivation levels, and trainability.

o The Meyer Briggs Test. This test indicates the method by which an individual analyzes data, feelings, senses, perceptions, or judgment.

o The Otis Intelligence Test. This correlates an individual's IQ with his adaptability; the higher the IQ, the easier it is to train an individual.

o The Group-Embedded Figures Test. This test determines perceptual and cognitive thinking ability.

The commander, in order to achieve the best candidate, should talk to a qualified psychologist, and explain what he is looking for in a candidate. That way, when a candidate is tested, the psychologist can then sit down with the commander and give him the best recommendation on the candidate's psychological profile.

The current method for the selection of snipers within a unit has been for each unit to establish its own selection criteria. This method, while addressing the current needs of the unit, may lead to inconsistency in future sniper selection.

To aid the commander in his selection of sniper candidates, there are several concrete prerequisites that should be met by the candidates prior to acceptance into the sniper program.

To meet the administrative prerequisites, the sniper candidate should:

o Be a member of the SOF (Active and Reserve Components), or be a selected DOD personnel.

o Have a passing score on the Army Physical Fitness Test (APFT) within one (1) month of the beginning of the sniper training program.

o Have scored expert with the M16A1/A2 rifle IAW Chapter 3, Section III, FM 23-9 (M16A1 and M16A2 Rifle Marksmanship) within one (1) month of training. Preferably, the candidate repeatedly scores expert during his biannual qualification.

o Have no record of drug or alcohol abuse.

o Have no record of punishment under the Uniform Code of Military Justice during his current enlistment.

o Have a GT score of 110 or above, an SC score of 110 or above, or a CO score of 110 or above.

o Be in the pay grade of E4 or above

o Have 20/20 vision, correctable IAW Chapter 32, paragraph 7-3g, AR 40-501 (Standards of Medical Fitness). Glasses are a liability unless the individual is otherwise highly qualified.

- Have had a psychological evaluation conducted under the direction of, and approved by a qualified medical expert. This examination will include, as a minimum, the MMPI and a psychiatric history mental status examination.

- Have at least 12 months of service remaining on active duty after completion of the sniper course.

- Have a SECRET clearance.

Note: All of the above are prerequisites to enter the Special Operations Target Interdiction Course at Fort Bragg, North Carolina.

Personal prerequisites may be determined by the commander through background checks, interviews, records review, and counseling sessions. Recommended personal prerequisites should include, but are not limited to, the following:

- Experience as a hunter or woodsman.

- Experience as a competitive marksman.

- Interest in weapons.

These first three personal prerequisites are particularly important when it comes to sustaining sniper skills, because the sniper with these characteristics will have a greater desire to practice these tasks as they are part of his avocation.

- Ability to make rapid, accurate assessments and mental calculations.

- Ability to maintain an emotionally stable personal life.

- Ability to function effectively under stress.

- Possession of character traits of patience, attention to detail, perseverance, and physical endurance.

- Ability to focus completely.

- Ability to endure solitude.

- Objectivity to the extent that one can stand outside oneself to evaluate a situation.

- Ability to work closely with another individual in confined spaces and under stress.

- Freedom from certain detrimental personal habits such as the use of tobacco products and alcohol. The use of these are a liability unless the candidate is otherwise highly qualified. (These traits, however, should not be the sole disqualifier.)

- First class APFT scores with a high degree of stamina, and preferably solid athletic skills and abilities.

- An attitude of determination is the most important.

After the commander has selected the sniper candidate, he must assess the individual's potential as a sniper. This assessment may be made by a thorough review of the candidate's records, objective tests, and subjective evaluations. The length of time a commander may devote to a candidate's assessment will vary with his resources and the mission. Normally, two or three days will suffice to complete an accurate assessment.

Assessment testing should include both written and practical tests. Practical examinations will actively measure the candidate's physical ability to perform the necessary tasks and subtasks involved in sniping. Written examinations will evaluate the candidate's comprehension of specific details.

Assessment testing must objectively and subjectively determine an individual's potential as a sniper. Objectivity measures the capacity to learn and perform in a sterile environment. Subjectivity assesses actual individual performance.

Objective assessment tests are presented as a battery grouped by subject matter and may be presented either as practical or written examinations. The following are some examples of objective testing:

- The shooting battery consists of a number of tests designed to evaluate the theoretical and practical applications of rifle marksmanship.

- The observation and memory battery consists of a number of tests designed to evaluate the candidate's potential for observation and recall of specific facts.

- The intelligence battery consists of standard military tests and previously mentioned specialized tests.

- The critical decision test consists of a number of tests designed to evaluate the candidate's ability to think quickly and use sound judgment.

- The motor skills battery will test hand-eye coordination.

Subjective assessment tests are designed to gain insight into the candidate's personality. Although the candidate is constantly observed in the selection and assessment process, specific tests may be designed to identify desirable and undesirable character traits. All subjective testing should be conducted or monitored by a trained psychologist (well versed in sniper selection). Examples of possible subjective test batteries include, but not limited to, the following:

- The interview. This should identify the candidate's motivation for becoming a sniper and examine his expectations concerning the training.

- The suitability inventory. This test basically compares the sniper candidate to a "predetermined profile" containing the characteristics, skills, motivations, and experience a sniper should possess.

Selection is conducted at the conclusion of the assessment program by a committee of assessors. While the commander should monitor all candidate selections, it is important for the committee to make the decision to preserve consistency and to rule out individual bias. The procedure for selection should be accomplished by a quorum during which the candidates are rated on a progressive scale. Candidates should be chosen based on their standing, in conjunction with the needs of the unit. At this time the best qualified soldiers should be selected; alternate and future candidates may also be identified. Additionally, the following guidelines should be adhered to:

- Candidates should not be apprised of their status during selection.

- Non-volunteers should not be considered.

- The best qualified candidates should be selected first.

- Soldiers not meeting set prerequisites should not be entered into the program.

1-6. QUALIFICATIONS OF SOTIC GRADUATES

Upon completion of the Special Operations Target Interdiction Course (SOTIC), the sniper is capable of shooting groups within two minutes of angle (MOA). This is grouping within 12 inches at 600 meters. He is able to: hit moving targets at 400 meters; hit head-sized targets at 200 meters with a three-second exposure; and move within 200 meters of an observer undetected. He understands camouflage and concealment, observation techniques, reporting

techniques, hide site selection, and hide construction. He is capable of first-round hits on man-sized targets out to 600 meters 100 percent of the time, and out to 900 meters 70 percent of the time. While this may sound impressive, it is not the desired final product. In order for the sniper to be "fully" qualified, he must be able to group within 6-7 inches at 600 meters. In other words, he must continually strive to improve in the art of sniping.

The only way the sniper can improve is through a comprehensive sniper sustainment training program. This program must not just sustain the sniper at his present level, it must challenge him to improve and better his skills. The program is mandatory in accordance with USASFC(A) Reg 350-1 (Component Training), and should be used as frequently as possible, with two weeks every six months as a minimum. Sniping skills are extremely perishable, and without this program the sniper will rapidly lose his skills and become ineffective.

1-7. THE SNIPER TEAM

In special operations, snipers are assigned in pairs. The sniper pair consists of two equally trained snipers who provide mutual security and support for each other. Snipers are employed in pairs for the purpose of enhancing the team's effectiveness and diminishing the stress that a single sniper would be more apt to encountar. Sniper pairs may also engage targets more rapidly and may stay in the field for longer periods of time than a single sniper.

When employed, the more experienced of the pair will act as the observer during the shot. This is especially important on a high priority target. The more experienced sniper is better able to read winds and give the shooter a compensated aim point which takes into account the effects of the environment, and consequently, better ensures a first-round hit. Additionally, a high priority target may warrant that both snipers engage the target to ensure a hit. The two man concept permits this flexibility.

Experience in World War I, World War II, etc., has shown that deploying snipers in pairs as a sniper/observer team significantly increases the success rate of the missions. With few exceptions, snipers who are deployed singularly have shown a marked decrease in their effectiveness and performance almost immediately after the start of the mission. This is due to the individual becoming overwhelmed with concern for his security, the tasks to be accomplished, and his own emotions, i.e., fear, loneliness, etc.

1-8. SNIPER TEAM ORGANIZATION

Sniper teame are organized into two-man pairs. The aniper team ia the bssic operationai organization for the employment of snipers, and is the corneratone of viable aniper employment and effectiveneaa. Snipera are trained to operste in two-man aniper taams. Either member of the peir can perform the function of the aniper (with the M24 or a specially selected weapon); the other member ia armad with the standard service rifla or the M21/LSR and performs the function of the obaerver. The two-man team is the amalleat orgsnization recommended. It offara mobility, concealment, and flexibility. The sniper peir can maintain continuous obaarvation of an area while alternating aecurity, sleeping, eating, atc., and relieving the stress inherent in a aingle-man operation. The coach-shooter relationship of the aniper pair is invaluable in target acquiaition, aatimation of range to targets, obaervation of bullat trace and impact, and offering correctiona to targets engaged. Additionally, the mutual aupport of two anipara working togethar ia a aignificant moraie fsctor during employment in combat environments or extanded missions.

Undar cartain circumstancas the taam may ba augmanted with s squad to platoon-sizad element. This element could ba usad for security, hida oonstruction, or as a covar for a stay-behind oparation. If tha augmantation is for sacurity purposas, the sacurity alamant muat be locatad far anough away from the taam to pravant its compromisa. Eight hundrad to 1,000 matars is a starting guidaline that must ba modifiad according to tha situation and tha tarrain. It is critical to mission success that tha anipar taam and tha augmantation unit be thoroughly familiar with aach othar and hava well davaloped SOPs.

Organizational grouping of snipers abova tha snipar taam laval is normally sccomplishad through the axpediant pooling of aniper taams into largar organizations. Such cantralizad grouping of sniper assats can prove beneficial to their employmant for spacific missions as opposad to aniper teams working indapandently. Centralizad control should be managad by tha anipar apacialiat within the unit. Ragardleaa of any provisional or temporsry sniper grouping, sniper teams should not be apiit; they sre moat effectively employed in the peira in which they hsve trainad.

Chapter 2

SPECIAL OPERATIONS SNIPER EQUIPMENT

Snipers, by the nature of their mission, must learn to exploit the maximum potential from all of their equipment. The organizational level of employment, and the mission will determine the type and amount of equipment needed. Snipers will carry only that equipment necessary for the successful accomplishment of their mission.

2-1. SNIPER WEAPON SYSTEMS (SWS)

M24 SWS

The current SWS is the M24 sniper rifle with the Leupold & Stevens Ultra 10X M3A rifle scope. The M24 is based on the Remington Model 700 long action with an adjustable trigger. The barrel is a heavy, 5 groove, 11.2 inch twist, stainless steel target barrel. The stock is constructed of fiberglass, graphite, and kevlar with an adjustable butt plate. The weapon is constructed to be accurate within 1/2 minute of angle (MOA) or 1/2 inch groups at 100 yards. The M24 is currently chambered for the 7.62 mm NATO cartridge. When it is chambered for the .300 Winchester Magnum cartridge, the M24 will be known as the Medium Sniper Rifle (MSR). The M24 is issued two per Operational Detachment.

The components of the M24 SWS (Figure 2-1-1) are as follows:

- Bolt action rifle
- Fixed 10x telescope, L&S M3A
- System case
- Scope case
- Detachable iron sights (front and rear)
- Deployment case and kit (Figure 2-1-1A)
- Optional bipod
- Cleaning kit
- Soft rifle case
- Operator's manual

The safety. The safety is located on the right rear side of the receiver and provides protection against accidental discharge under normal usage when properly engaged. The sniper should follow the rules below.

To engage the safety, place it in the "S" position (Figure 2-1-2).

Always place the safety in the "S" position before handling, loading, or unloading the weapon.

When the weapon is ready to be fired, place the safety in the "F" position (Figure 2-1-3).

Bolt assembly. The bolt assembly locks the round into the chamber and extracts the round from the chamber. The sniper should follow the rules below:

To remove the bolt from the receiver, place the safety in the "S" position, raise the bolt handle, and pull it back until it stops. Push the bolt stop release up (Figure 2-1-4) and pull the bolt from the receiver.

To replace the bolt, ensure the safety is in the "S" position, align the lugs on the bolt assembly with the receiver (Figure 2-1-5), slide the bolt all the way into the receiver, and then push the bolt handle down.

Trigger assembly. Pulling the trigger fires the rifle when the safety is in the "F" position. The operator may adjust the trigger pull force from a minimum of 2 pounds to a maximum of 8 pounds. This is done using the 1/16-inch allen wrench provided in the deployment kit. Turning the trigger adjustment screw (Figure 2-1-6) clockwise will increase the force needed to pull the trigger. Turning it counterclockwise will decrease the force needed. This is the only trigger adjustment the sniper should make. (CAUTION! Too light of an adjustment will cause the weapon to discharge when disengaging the safety, loading, or if the weapon is dropped while the safety is in the "F" position.)

Stock adjustment. The M24 has a mechanism for adjusting the length of pull of the stock. The thick wheel provides this adjustment. The thin wheel is for locking this adjustment (Figure 2-1-6A). Turn the thick wheel clockwise to lengthen the stock, or counterclockwise to shorten the stock. To lock the position of the shoulder stock, turn the thin wheel clockwise against the thick wheel. To unlock the position of the shoulder stock, turn the thin wheel counterclockwise away from the thick wheel. The length of pull is adjusted so that when the butt of the rifle is placed alongside the shooting forearm against the base of the bicep, the trigger finger's first joint is in line with the trigger.

Inspection. The M24 is designed to be repaired by the operator. Deficiencies that cannot ba repaired by the sniper will require menufacturer warrsnty work. Refer to TM 9-1005-306-10 thet ie furnished with each weapon aystem. The sniper ehould check the following areas when inspecting the M24:

- o The appearence and completeneaa of all parts.
- o The bolt to ensura it has the seme aerial number as the receiver, and that it locks, unlocks, and moves smoothly.
- o The safety to ensure it can ba positively pleced into the "S" end "F" positions easily without being too difficult or moving too frsely
- o The triggar to ensure the weapon will not fire when the safety is in the "S" position, and that it has a smooth, crisp trigger puli when the safety is in the "F" position.
- o The action screws (front of the internal magazine and rser of the trigger guard) for proper torque (65 inch-pounds).
- o The telescope mounting ring nuts for proper torque (65 inch-pounds).
- o The stock for eny cracks, spiits, or sny contact it may hsve with the barrel.
- o The telescope for obstructions such as dirt, dust, snd moisture, snd loose or damaged lenses.

Iron sights. The M24 has a backup sighting system consisting of detschable front snd rsar iron sights. To install the iron sights, the snipar must first remove the telescops. The sniper should follow the rulss balow.

To sttach the front sight to the barrel, align the front sight end ths front sight bass dovetaiia snd alide ths sight over the base. Next, tighten the screw slowly, ensuring that the screw ssats into the recess in the sight base (Figure 2-1-7).

To sttach the rsar sight to the receiver, remove one of the thrse set screws, snd align the rear aight with the rear sight baee located on the left rear of the receiver (Figure 2-1-8). Tightsn the screw to secure the aight to the base.

Loading. Ths M24 has sn internal, five-round capacity magazine. To load the rifle, th sniper should:

- o Point the weapon in s safs direction.
- o Ensure the safety is in the "S" position.

o Raise the bolt handle and pull it back until it stops.

o Push five rounds of 7.62 mm ammunition one at a time through the ejection port into the magazine. Ensure that the bullet end of the rounds is aligned toward the chamber.

o Push the rounds fully rearward in the magazine.

o Once the five rounds are in the magazine, push the rounds downward while slowly pushing the bolt forward over the top of the first round.

o Push the bolt handle down. The magazine is now loaded.

o To chamber a round, raise the bolt and pull it back until it stops.

o Push the bolt forward. The bolt strips a round from the magazine and pushes it into the chamber.

o Push the bolt handle down.

o To fire, place the safety in the "F" position and pull the trigger.

Shipment for Unserviceable Maintenance. See TM 9-1005-306-10.

M21 SWS

The National Match M14 rifle and its telescope make up the M21 SWS (Figure 2-1-9). The M21 is a match-grade M14 rifle equipped with a 3-9x adjustable ranging telescope (ART I/II). The M21 is accurized IAW United States Army Marksmanship Training Unit specifications and has the same basic design and operation as the standard M14 rifle (FM 23-8), except for specially selected and hand-fitted parts. The M21 has been replaced by the M24; however, the M21 is still in use throughout the US Army. Once the M24 is fully fielded, the M21 can be used as the sniper team defensive/back-up SWS. The future SOF Light Sniper Rifle (LSR) is be based on the M14 action, and will be issued two per Operational Detachment.

Description:

o The barrel is match-grade, gauged and selected to ensure correct specification tolerances. The bore is not chrome-lined.

o The stock is walnut and impregnated with an epoxy.

o The receiver is individually custom-fitted to the stock with a metal-filled epoxy compound.

o The firing mechanism is reworked and polished to provide for a crisp hammer release. Trigger weight is between 4.5 and 4.75 pounds.

o The flash suppressor is fitted and reamed to improve accuracy and eliminate any misalignment.

o The gas cylinder and piston are reworked and polished to improve operation and reduce carbon buildup.

o The gas cylinder and lower band are permanently attached to each other.

o The entire rifle is composed of parts that are carefully selected, fitted, and assembled.

Inspection. Deficiencies discovered during inspection will be reported to the unit armorer. The sniper should inspect the following areas:

o The appearance and completeness of all parts. Shiny surfaces should be treated.

o The flash suppressor for misalignment, burrs, or evidence of bullet tipping. The suppressor should be tight on the barrel.

o The front sight to ensure that it is tight, that the blade is square, and that all edges and corners are sharp.

o The gas cylinder to ensure that it fits tightly on the barrel. The gas plug should be firmly tightened.

o The forward bend on the stock to ensure that it does not bind against the gas cylinder front band.

o The handguard to ensure that it is not binding against the receiver, the top of the stock, or the operating rod.

o The firing mechanism to ensure the weapon will not fire with the safety "on," and that it has a smooth, crisp trigger pull when the safety is "off."

o The rear sight tension by turning the aperture up to the "10" position. Press down on the top of the aperture with the thumb. If the aperture can be pushed down, the tension must be readjusted.

o The stock for splits or cracks.

Iron Sights. The M21 SWS is equipped with National Match front and rear sights (Figure 2-1-10). The front sight is used to obtain a battle zero for windage, so that the rear sight can be

centered on its markisgs. The frost eight is moved in the opposite direction thet the ssiper wanta the ahot group to move.

The rear sight hss e pinion asaembly thst sdjusts the elevation of the eperture. When the aniper turns the elevation knob clockwise, it raiaea the point of impect. Turning it counterclockwise lowera the point of impact. Esch click of the ksob ia worth 1 MOA. The hooded eperture is elso adjustsble snd providea .5 MOA chenges in elevetion. Rotsting the spsrture so that the indicstion notch ie et the top reiaea the point of impsct .5 MOA. Rotating the indication notch to the bottom lowers the point of impact. The windage knob adjuats the latsrsl movement of the rear aight. Turning the knob clockwiss moves the point to impsct to the right end turning it counterclockwise movea the point of impact to the left. Eech click of the windage knob is .5 MOA.

Loading and Unloading. When the aniper loeda the M21, he locka the bolt to the rear and place the weapon in the aafe posaition. Inaert the magazine into the magazine well by puahing up, then pulling tha bottom of the magazine to tha rear until the magazine catch givea an audible click. To chambar a round, pull tha bolt alightly to the rear to releaaa tha bolt catch, then raleeae tha bolt. (CAUTION! Do not "rida" the bolt forward. Allow the mainapring to close the bolt.) To unload the M21, firat place tha waapon on "aafe." Depreaa tha magazine releaaa latch, and mova tha magazine in a forward and downward motion at tha aama tima. Lock the bolt to the raar and remova tha chamberad round.

2-2. TELESCOPIC SIGHTS

A telescopic sight mounted on the rifla sllowa tha sniper to detect and engage targeta more effectively than ha could by uaing tha iron aighta. Unlike aighting with iron sighta, tha target'a image in the teleacope ia on the sama focal plane aa the aiming point (reticle). This ellowa for a clearer picture of tha target snd reticle because the eye can focus on both simultaneously.

Another sdventage of the telescope ia ita ability to msgnify the target. Thia increeses the reaolution of the target'a image, making it claarer end more defined. The everage unaided human eye can diatinguish detail of sbout 1 inch at 100 meters (1 MOA). Magsificstion, combined with well-dealgned optics, permit resolution of thia 1 inch divided by the magnificstion. Thua, a 1/4 MOA of detail csn be seen with e 4-power scope st 100 maters, or 1 inch of detail csn be seen et 600 maters with e 6-power acope.

Additioselly, teleacopic sights magnify the ambient light, making ahots possible earlier end leter during the day. Although a telescope helps the aniper to aee better, it doea not help him to shoot better.

Leupold & Stevens M3A Telescope

Description. The M3A is a fixed 10x telescope with a ballistic drop compensator dial for bullet trajectory from 100 to 1,000 meters. The elevation knob is marked in 50-meter increments, and has one MOA elevation adjustments. The windage knob is in 1/2 MOA increments, and a third knob provides for focus/parallax adjustment. The reticle is a duplex cross hair with 3/4 MOA mil dots (Figure 2-2-1). The mil dots are 1 mil apart, center to center, with a possible 10 mils vertical and 10 mils horizontal. The mil dots are used for range estimation, holdover, windage holds, and mover leads.

The design and operating principle of the M3A scope is different from the ART series of telescopes. The major difference in the M3A is the adjustment method used to compensate for the trajectory of the bullet at varying distances.

The M3A consists of: the telescope, a fixed mount, a detachable sun shade for the objective lens, and dust covers for the objective and ocular (eyepiece) lens

The telescope has a fixed 10x magnification, which gives the sniper better resolution than with the ART series.

There are three knobs located midway on the tube: the focus/parallax, elevation, and windage knobs (Figure 2-2-2).

Adjustments. The focus/parallax knob is located on the left side of the tube. It is used to focus the target's image onto the same focal plane as the reticle, thereby reducing parallax to a minimum. Parallax is the apparent movement of the sight picture on the reticle when the eye is moved from side to side or up and down. The focus knob has two extreme positions indicated by the infinity mark and the largest of four dots. Adjustments between these positions focus images from less than 50 meters to infinity.

The elevation knob is located on top of the tube. This knob has calibrated index markings from 1 to 10. These marking represent the elevation setting adjustments needed at varying distances: 1 = 100 meters, 10 = 1,000 meters. Each click of the elevation knob equals 1 MOA.

The windage knob is located on the right side of the tube. This knob is used for lateral adjustments. Turning the knob in the direction indicated moves the point of impact in that direction. Each click on the windage knob equals 1/2 MOA.

The eyepiece is adjusted by turning it in or out of the tube until the reticle appears crisp and clear to the assigned operator. Focusing the eyepiece should be done after mounting the telescope on the rifle. Grasp the eyepiece and back it away from the lock ring. Do not attempt to loosen the lock ring first; it will

automatically looaen when the eyepiece is backed away (no toola are needed). The eyepiece is rotatsd several turns to move it at laaat 1/8 inch. Thia much change ia needed to achieve any meaaurable effect on the reticle clarity. Look through the acope at the aky or a blank wall, and check to see if the reticle appeara sharp and criap.

Scope Mount. The scops mount consiats of a base plate with four screwa and a pair of scope rings (each with an upper and lower ring half) with eight ring acrewa (Figure 2-2-3). Tha baae plate ia mounted tc the rifle by acrewing the four basa plate acrsws through the plate and into tha top of the receiver. The scrsws muat not protrude into ths rsceiver and interrupt the functioning of the bolt. It is advisabla to uae medium strsngth "Loctite" on theae four baaeplata scrsws for a more permansnt attachment. After the base plate is mountsd, the scope rings are mounted.

When the sniper mounts the acope rings, he ahould select one of alota on the mounting baae and engage the ring bolt apline with tha aalsctsd alot. Push the ring forward to gat apline-to-base contact as the mount ring nut ia tightened. Chack tha sya reliaf. If tha telaascope needs to ba adjuated, the ring nuta ara looaanad and the ring bolts sra aligned with the other aet of alcta on ths baaa; and tha procaaa ia repeated. Enaure that tha croaa haira sre parfactly alignad (vartically and horizontaiiy) with tha rifle. Any cant will cauaa miaaea at longar ranges. Onca aatiafisd with the eye rslief obtainad (approximataly 3 to 3 1/2 inchea), tighten the ring nuta to 65 inch-pounda uaing tha T-handla torque wrench (found in the deployment caae).

Operation. Whan uaing the teleacope, tha aniper should aimply look at ths targat, focua tha teleacope, datermine tha diatanca to the targat by uaing tha mil dots on the reticla, snd then adjuat the elevation knob for the astimated ranga. Place the croas hair on the deairad point of impact.

Adjustable Ranging Telescopes

The adjuatable ranging taiescope (ART) is a component of the M21 SWS. The two typea of ARTa found on the M21 are the ART I and ART II. Both teleacopea ahare the aame baaic deaign and operating principle. Thersfore, they will be deacribed together, with their differencea highlighted.

Description. The ART ia a 3- 9x variable telescopic sight modifiad for uae with the aniper rifle. Thia teleacope has a balliatic cam mounted to the power adjustmant ring on the ART I (Figure 2-2-4). The ART II has a aeperate ballistic cem and power ring (Figurs 2-2-5). The ART ia mounted on a apring-loaded base that is adapted to fit the M14. Ths lens aurfeces ara coated with a hard film of magnesium fluoride for maximum light tranamiaaion. It is tranaported in a hard carrying case when not mounted to the rifla.

These telescopes have modified reticles. The ART I has the basic cross hair design with two horizontal stadia lines that appear at the target's distance, 15 inches above and 15 inches below the cross hair intersection. It also has two vertical stadia lines that appear at the target's distance, 30 inches to the left and 30 inches to the right of the cross hair intersection (Figure 2-2-6). The ART II reticle consists of three posts: two horizontal and one bottom vertical post (Figure 2-2-7). The thickness of these posts represents 1 meter at the target's distance. The reticle has a basic cross hair with two dots on the horizontal line that appear at the target's distance, 30 inches to the left and 30 inches to the right of the cross hair intersection.

A ballistic cam is attached to the power adjustment ring on the ART I, and the ART II has a separate power adjustment ring and ballistic cam.

The power ring on both telescopes increases and decreases the magnification, while the ballistic cam raises and lowers the telescope to compensate for elevation.

Adjustments. The sniper should make focus adjustments by screwing the eyepiece into or away from the telescope tube until the reticle appears crisp and black. (Procedure detailed in Appendix I).

Located midway on the scope tube are the elevation and windage turrets with dials that are used for zeroing adjustments. These dials are graduated in 1/2 MOA increments. Turning the dial will move the point of impact as indicated on the dial.

Scope Mount. The ART mount is made of light-weight aluminum and consists of a side-mounting plate and a spring-loaded base with attached telescope mounting rings. The mount is designed for low-profile mounting of the telescope to the rifle, using the mounting guide grooves and threaded hole(s) on the left side of the M14 receiver. The ART I has one thumbscrew that screws into the left side of the receiver (Figure 2-2-8). The ART II mount has two thumbscrews; one is screwed into the left side of the receiver, and the other is screwed into the modified cartridge clip guide in front of the rear sight (Figure 2-2-9).

Operation. The ART telescopes are designed to automatically adjust for the needed elevation at ranges from 300 to 900 meters. This is done by increasing or decreasing the magnification of the telescope until a portion of the target's image matches the represented measurement of the telescope's reticle.

ART I: The power ring on the ART I is adjusted until 30 inches of an object or a person's image (beltline to the top of the head) fits exactly in between the horizontal stadia lines (Figure 2-2-10).

ART II: The power ring on the ART II is adjusted until 1 meter (about 40 inches) of an object or person's image (crotch to the top of the head) appears equal to one of the posts in the reticle (Figure 2-2-11).

When the power ring is turned to adjust the target's image to fit the reticle, the ballistic cam is also turned. This raises or lowers the telescope itself to compensate for elevation. Once the telescope's magnification is properly adjusted to bracket the target, the ballistic cam has adjusted the telescope for the proper elevation needed to engage the target at that distance.

The ART II has a locking thumbscrew located on the power ring to connect and disconnect the power ring from the ballistic cam. This allows the sniper to adjust the telescope onto the target (auto-ranging mode) and then disengage the locking thumbscrew to increase magnification (manual mode) without affecting the elevation adjustment.

2-3. AMMUNITION

7.62x51mm NATO M118 Special Ball or M852 National Match ammunition is used with the SWSs. The SWS must be re-zeroed every time the type or lot of ammunition is changed. The ammunition lot number is printed on the cardboard box, metal can, and wooden crate the ammunition is packaged in. The sniper should maintain this information in the weapon's data book.

Snipers should always attempt to use match-grade ammunition when available because of its greater accuracy and lower sensitivity to environmental effects. However, if match-grade ammunition is not available, or if the situation requires, a different grade of ammunition may be used. Standard-grade ammunition may not provide the same level of accuracy or point of impact as match-grade ammunition. In the absence of match-grade ammunition, firing tests should be conducted to determine the most accurate lot of ammunition available. Once a lot of ammunition is identified as meeting the requirements, this lot should be used as long as it is available.

Types and Characteristics

M118 Special Ball. The M118 Special Ball bullet consists of a gilding metal jacket and a lead antimony slug. It is a boat-tailed bullet (the rear of the bullet is tapered to reduce drag) and has a nominal weight of 173 grains (most are closer to 175 grains). The tip of the bullet is not colored. The base of the cartridge is stamped with the NATO standardization mark (circle and cross hair), manufacturer's code, and year of manufacture. Its primary use is against personnel. Its accuracy standard requires a 10-shot group to have an extreme spread of not more than 12 inches at 550 meters (2 MOA) when fired from an accuracy barrel in

a test cradle. The stated velocity of 2550 feet per second (fps) is measured at 78 feet from the muzzle. The actual muzzle velocity of this ammunition is 2610 fps. M118 is the primary choice for both the M24 and M21 SWSs because the telescopic sights are ballistically matched to this ammunition out to 1,000 and 900 meters, respectively.

M852 National Match (open-tip). As of October 1990 the Department of State, Army General Counsel, and the Offices of the Judge Advocate General concluded that the use of open-tip ammunition does not violate the laws-of-war obligation of the United States. This ammunition may be employed in peacetime or in wartime missions of the Army, Navy, and Marine Corps.

Description. The M852 bullet is boat-tailed, 168 grains in weight, and has an open tip. The open tip is a shallow aperture (about the diameter of the wire in a standard-size straight pin or paper clip) in the nose of the bullet. Describing this bullet as a hollow point is misleading to law-of-war terms. A hollow-point bullet is typically thought of in terms of its ability to expand upon impact with soft tissue. Physical examination of the M852 open-tip bullet reveals that its opening is small in comparison to the aperture of hollow-point hunting bullets. For example, the 165 grain hunting bullet is a true hollow-point, boat-tailed bullet with an aperture much larger in size than that of the M852's bullet. It also contains serrations cut into the jacket to ensure expansion. In the M852, the open tip is closed as much as possible to provide better aerodynamics and contains no serrations. The lead core of the M852 bullet is entirely covered by the bullet jacket.

Purpose. The small, shallow aperture in the M852 provides a bullet design that offers maximum accuracy at long ranges. The jacket is rolled around its core from base to tip; standard military bullets and other match bullets have their jacket rolled around its core from tip to base, leaving an exposed lead core at the base. The design of the M852 was to produce a bullet that would not expand or flatten easily upon impact with the human body or otherwise cause wounds greater than those caused by standard military small-arms ammunition.

Performance. Other than its superior long-range accuracy capabilities, the M852 was examined with regard to its performance upon impact with the human body or to artificial material that approximates soft human tissue. In some cases, the bullet will break up or fragment after entry into soft tissue. Fragmentation depends on many factors, including the range to the target, velocity at the time of impact, degree of yaw of the bullet at the point of impact, or the distance traveled point-first within the body before yaw is induced. The M852 was not designed to yaw intentionally or break up upon impact. These characteristics are common to all military rifle bullets. There was little discernible difference in bullet

fragmentation between the M852 and other military small-arms bullets. Some military ball ammunition of foreign manufacture tends to fragment sooner in human tissue or to greater degree, resulting in wounds that would be more severe than those caused by the M852 bullet.

NOTE: M852 is the best substitute for M118 taking the following limitations into consideration.

o The M852's trajectory is not identical to the M118's trajectory, therefore, it is not matched ballistically with the M3A or ART I/II telescopes.

o M852 is not suited for target engagement beyond 600 to 700 meters because the 168 grain bullet is not ballistically suitable. This bullet will drop below the sound barrier just beyond this distance. The severe turbulence that it encounters as it becomes sub-sonic effects its accuracy at distances beyond 600 to 700 meters.

M82 Blank. The M82 blank ammunition is used during sniper field training. It provides the muzzle blast and flash that can be detected by trainers during the exercises that evaluate the sniper's ability to conceal himself while firing his weapon.

Alternative Ammunition

If match-grade ammunition is not available, standard 7.62x51mm NATO ball ammunition can be used. However, the M3A and ART I/II telescopes' bullet drop compensators are designed for M118 Special Ball, and there would be a significant change in zero. Standard ammunition should be test-fired and the ballistic data recorded in the data book. Standard ball ammunition should be used in an emergency situation only.

M80/M80E1 Ball. The M80 and M80E1 ball cartridge bullet consists of a gilding metal jacket with a lead antimony slug. It is boat-tailed and weighs 147 grains. The tip of the bullet is not colored. It is primarily used against personnel. Its accuracy standard requires a 10-shot group to have an extreme spread of not more than 24 inches at 550 meters (4 MOA) when fired from an accuracy barrel in a test cradle. The muzzle velocity of this ammunition is 2800 fps. The base of the cartridge is stamped with the NATO standardization mark, manufacturer's initials, and the date of manufacture. Several lots should be test-fired prior to use due to the reduced accuracy and fluctuation in lots. The most accurate lot that is available in the largest quantity (to minimize test repetition) should be selected for use.

M62 Tracer. The M62 tracer bullet consists of a gilding metal-clad steel jacket, a lead antimony slug, a tracer aubigniter, and igniter composition. It has a closure cap and weighs 141 grains. The bullet tip is painted orange (NATO identification for

tracsr smmunition). It is osed for observation of fire, incsndisry, snd signsling purposes. Tracer ammunition is manufsc·tured to have an accursсy standard that requires 10·shot groups to have an sxtreme spresd of oot more than 36 inches at 550 meters (6 MOA). The base of the cartridge is stsmped with the NATO standsrdizstion mark, maoufscturer's initisls, and dste of manufscture. The smount of trscer ammunition fired through SWSs should be minimized becsuse of its harmful effect on the precision·made barrsl.

Round Count Book

Ths snipsr maintsins s running couot of the number snd type of rounds firsd through the SWS. It is imperstive to sccurstely maintsin the round count book ss the SWS should be re·barreled sfter 10,000 rounds of firiog or after s ooticesble loss of sccursсy.

2-4. OeSERVATION DEVICES

Asids from the rifls snd tslsscopic sight, ths snipsr's most important tools sre opticsl devicss. The categoriss of opticsl squipment normally smployed by snipers sre: binoculsrs, tslsscopss, rsngs finders, snd night vision dsvicss. Selsctsd opticsl squipmsnt for spscisl purposss will be discussed.

Binoculsrs

Evsry snipsr should be issued binoculsrs; thsy srs ths snipsrs' primsry tool for observstion. Binoculsrs provids sn opticsl edvsntsge not found with tslsscopss or othsr monoculsr opticsl dsvicss. Ths binoculsrs' typicslly lsrgsr objective lsns, lower msgnificstion, snd binocuier chsrecteristics edd dspth snd fisld of visw to sn obssrved srss. Many types of binoculsrs srs svsilsbls. Binoculsr selection should tske the following into sooount:

o Dursbility. The binoculsrs must be sble to withstsnd rough uss undsr fisld conditions. Thsy must be wssthsrproof·· sssisd sgsinst moisture thst would rsoder them useless due to internsl fogging. Biooculsrs with individuslly·focussed eyepieces csn more sssily be msde waterproof thsn centrslly·focussed binoculsrs. Most wsterproof biooculsrs offersd hsve individuslly·focusssd eyepieces.

o Size. Snipsrs' biooculsrs should be relstivsly compsct for esse of handliog sod cooceslment.

o Moderste msgnificstioo. Biooculsrs of 6 to 8 power sre bsst suited for sniper work. Higher magoificstions tend to limit the field of view for aoy giveo size of objective lens. Additionally, higher magnificstions tend to intensify hand movements during observstion, sod compresses depth perception.

o Lens diameter. Binoculars with an objective lens dismeter of 35 to 50 mm should be considered the best choice. Larger lenses permit more light to enter; therefore, the 50 mm lens would be more effective in low-light conditions.

o Mil scale. The binoculars should have a mil scale incorporated into the field of view for range estimation

Method of holding binoculars. Binoculars should be held lightly, resting on, and supported by the heels of the hands. The thumbs are positioned to block out light that would enter between the eyes and the eyepieces. The eyepieces are held lightly to the eyes to avoid transmitting body movement. Whenever possible, a stationary rest should support the elbows. An alternate method for holding the binoculars is to move the hands forward, cupping them around the sides of the objective lenses. This keeps light from reflecting off the lenses, which would reveal the sniper's position. The sniper should always be aware of reflecting light. The sniper should operate from within shadows or cover the lens with an extension or thin veil (example: nylon stocking).

Adjustments. Interpupillary adjustment is the movement of the monocles to fit an individual's eyes. Interpupillary distance is the distance between the eyes. The monocles are hinged together for ease of adjustment. The hinge is adjusted until the field of vision ceases to be two overlapping circles and appears as a single, sharply defined circle. The setting on the hinge scale should be recorded for future use.

Every individual and each eye of that individual requires different focus settings. The sniper should adjust the focus for each eye in the following manner: with both eyes open, look at a distant object, then through the binoculars at this same object. Place one hand over the objective lens of the right monocle and turn the focusing ring of the left monocle until the object is sharply defined. Uncover the right monocle and cover the left one. Rotate the focusing ring of the right monocle until the object is sharply defined. Uncover the left monocle. The object should be clear to both eyes. The sniper should glance frequently at the distant object with his eyes during this procedure to ensure that his eyes are not compensating for an out-of-focus condition. Read the diopter scale on each focusing ring and record for future reference. Correctly focused binoculars will prevent eye strain when observing for extended periods.

Eye fatigue. Prolonged use of the binoculars or telescope will cause eye fatigue, reducing the effectiveness of observation. Periods of observation with optical devices should be limited to 30 minutes, followed by a minimum of 15 minutes rest. Eye strain can be minimized during observation by glancing away at green grass or any other natural, subdued color.

M22 Binoculars

The M22 binoculers (Figure 2-4-1) are the newest in the inventory, and are general issue. These biooculars have the seme features as the M19, plus fold-down eyepiece cups for personnel who wear glasses, to reduce the distance between the eyes and the eyepieces. It also has protective covers for the objective and eyepiece lenses. The binoculars have laser protection filters on the insides of the objective lenses (DIRECT SUNLIGHT REFLECTS OFF OF THESE LENSES!). The reticle pattern (Figure 2-4-2) is different from the M19's reticle.

Observation Telescope M49 and Tripod

Description. The M49 observation telescope is e prismetic optical instrument of 20 power magnificatioo (Figure 2-4-3). The lenses are coated with magnesium fluoride for improved light-transmitting capability. It is carried by the sniper team whenever needed for the mission. The telescope is used by the designated observer to assist in observation and selection of targets while the sniper is in the position to fire. Properly used, the M49 telescope can significantly enhance the success of the snipers' mission by allowing them to conduct a superior target analysis, reading of the current environmental conditions, and make spotting corrections by observing bullet trace and impact. The high magnification of the telescope makes observation, target detection, and target identification possible where conditions such as range would otherwise prevent identification. Camouflaged targets and those in deep shadows are more readily detected.

Operation of the M49. An eyepiece cover cap and objective lens cover are used to protect the optics when the telescope is not in use. Care must be taken to prevent cross-threading of the fine threads. The eyepiece focusing sleeve is turned clockwise or counterclockwise until the image can be clearly seen by the operator.

Operation of the M15 Tripod. The height adjusting collar is used to maintain a desired height for the telescope. The collar is held in position by tightening the clamping screw. The shaft rotation locking thumb screw clamps the tripod shaft at any desired azimuth. The elevating thumbscrew is used to adjust the cradle of the tripod, and to increase or decrease the angle of elevation of the telescope. The tripod legs can be held in an adjusted position by tightening the screw nut at the upper end of each leg.

Setting up the M49 and Tripod. Spread the legs and place the tripod on a level position on the ground so that the cradle is level with the target area. Place the telescope through the strip loop of the tripod and tighten the strap to keep the telescope in place and steady. If the tripod is not carried, an expedient rest should be used for the scope. The scope needs a steady position to maximize its capabilities and minimize eye strain.

2-5. NIGHT VISION DEVICES

Snipers use night vision devices (NVDs) to accomplish their mission during limited visibility operations. NVDs can be employed as observation aids, weapons sights, or both.

Employment factors. First- and second-generation NVDs amplify the ambient light to provide an image of the observed area or target. These NVDs will not function in total darkness because they do not project their own light source, and therefore, require target illumination. NVDSs work best on bright, moonlit nights. When there is no light or the ambient light level is low (such as in heavy vegetation), the use of artificial or infrared light improves the NVD's performance.

Fog, smoke, dust, hail, or rain limit the range and decrease the resolution of NVDs.

NVDs do not allow the operator to see through objects in the field of view. The operator will experience the same range restrictions when viewing dense wood lines as he would when using other optical sights.

Initially, an operator may experience eye fatigue when viewing for prolonged periods. Initial exposure should be limited to 10 minutes, followed by a 15 minute rest period. After several periods of viewing, the observation time limit can be safely extended. To aid in maintaining continuous observation and to reduce eye fatigue, the operator should alternate his viewing eyes often.

Night Vision Sight, AN/PVS-2

The AN/PVS-2 is a first-generation NVD (Figure 2-5-1). It can resolve images in low ambient light conditions better than second-generation NVDs can. However, first-generation NVDs are larger and heavier. Characteristics of the AN/PVS-2 are as follows:

Length	18.5 inches
Width	3.34 inches
Weight	5 pounds
Magnification	4 power
Range	dependent on ambient light conditions
Field of view	171 mils
Focus range	4 meters to infinity

Night Vision Sight, AN/PVS-4

The AN/PVS-4 is a portable, battery-operated, electro-optical instrument that can be hand-held for visual observation or weapon-mounted for precision fire at night (Figure 2-5-2). The observer can detect and resolve distant targets through the unique capability of the sight to amplify reflected ambient light (moon, stars, or skyglow). The sight is passive; thus, it is free from enemy detection by visual or electronic means. This sight, with the appropriate adapter bracket, can be mounted on the M16, M21, or M24.

Second-generation NVDs, characterized by the AN/PVS-4, possess the advantage of smaller size and weight over first-generation NVDs. However, they do not possess the extreme low-light capability of the first-generation devices. The AN/PVS-4 also offers advantages of internal adjustments, changeable reticles, and protection from blooming (the effect of a single light source, such as a flare or streetlight, which would overwhelm the entire image). Characteristics of the AN/PVS-4 are as follows:

Length	12 inches
Width	3.75 inches
Weight	3.5 pounds
Magnification	3.6 power
Range	400 meters/starlight, 600 meters/moonlight for a man-sized target
Field of view	258 mils
Focus range	20 feet to infinity

Uses. When mounted on the M16 rifle, the AN/PVS-2/4 is effective in achieving a first-round hit out to and beyond 300 meters, depending upon the light conditions. The AN/PVS-2/4 is mounted on the M16 since the NVD's limited range does not make its use practical for the 7.62 mm sniper weapon systems. This avoids problems that may occur when removing and replacing the NVD. The NVD provides an effective observation capability during limited visibility operations. The NVD does not give the width, depth, or clarity of daytime optics. However, a well-trained operator can see enough to: analyze the tactical situation, detect enemy targets, and engage targets effectively. The sniper team uses the AN/PVS-2/4 to:

- Enhance their night observation capability.
- Locate and suppress hostile fire at night.
- Deny enemy movement at night.

- Demoralize the enemy with effective first-round hits at night.

Snipers should weigh the advantages and disadvantages between the AN/PVS-2 and the AN/PVS-4 when the choice is available. The proper training and knowledge with NVDs cannot be overemphasized. The results obtained with NVDs will be directly attributable to the sniper's skill and experience in their employment.

KN200/KN250 Image Intensifier (SIMRAD)

The KN200/250 image intensifier (Figure 2-5-3) increases the use of the existing M3A telescope. It is mounted as an add-on unit and enables the sniper to aim through the eyepiece of the day sight both during day and night--an advantage not achieved with traditional types of NVDs. Sudden illumination of the scene does not affect sighting abilities. These image intensifiers can be used with both second- and third-generation image intensifier tubes and do not require modification. The exact position of the image intensifier relative to the day sight is not critical due to the unique design. As boresighting is not required, the mounting procedures take only a few seconds. The KN200/250 technical specifications:

	KN200	KN250
Magnification	1 X +/- 1%	
Field of View	10 degrees	12 degrees
Mounting Tolerance	+/- 1 degree	
Objective Lens	100 mm	80 mm
Focusing Range	Fixed	
Battery Life	40 hours at 25 degrees C with two alkaline AA cells	
Operating Temperature	-30 to +50 degrees C	
Weight (excluding bracket)	1.4 kg	0.7 kg

Night Vision Goggles, AN/PVS-5

The AN/PVS-5 is a lightweight, passive night vision system that gives the sniper team another means of observing an area during limited visibility (Figure 2-5-4). The sniper normally carries the goggles, because the observer has the M16 mounted with the NVD. The goggles' design make them easier to view with. However, the same limitations that apply to the nightsight also apply to the goggles.

Night Vision Goggles, AN/PVS-7 Series

The night vision gogglea, AN/PVS-7 (Figure 2-5-5) can be used inatead of the AN/PVS-5 gogglea. These goggles provide better resolution and viewing ability than the AN/PVS-5 goggles. The AN/PVS-7 aeriaa goggles come with e head-mount aaaembly thst sllows them to be mounted in front of the fece to free both hsnda. The goggles csn be used without the mount eaaembly for hsnd-held viewisg. (See TM 11-5855-262-10-1).

Laaer Obaarvatios Sat, AN/GVS-5

Depending on the miasion, asipera can uae the AN/GVS-5 to determine increaaed diatascea more eccurately. The AN/GVS-5 (Figure 2-5-6) ia ao individuaiiy operated, hand-held, diatance-meaauring davice deaigned for diatencea from 200 to 9,990 metera (with an error of plua or misua i0 meters). It measures diatancea by firisg as infrared beam et e target end meaauring the time the reflected beam takea to return to the operstor. It then diaplays the target diatance, in metera, inside the viewer. The reticle pattarn in the viewer ia graduated in 10-mil incrementa and haa display iighta to indicate low bettery and multiple targat hita. If tha beam hita more than ona target, the diaplay gives a reading of the cloaeat target hit. The beam that ia fired from the aet poaea a aafety hazard; therefore, anipera planning to uae thia equipment ahould be thoroughiy trained in ita aafe operation. (See TM 11-5860-201-10).

Mini-Eyesafe Laaer Infrared Obaervation Set, AN/PVS-6

The AN/PVS-6 (Figure 2-5-7) containa the following componenta: mini-eyaaafe laaer range finder; betteriea, BA-6516/U, non-rechar-geable, lithium thionyl chioride; carrying caae; ahipping caae; tripod; lena cleaning compound and lena cieaning tiaaue; and operator'a manual. The iaaer range finder ia the major component of the AN/PVS-6. 1t is iightweight, individually operated, and hand-held or tripod-mounted; it can accurately detarmine ranges from 50 to 9,995 metera in 5-meter incramenta and diaplaya the range in the ayepiece. 1t can aiao be mounted with and boreaighted to the night obaervation device, AN/TAS-6, Long-range.

2-6. STANDARD M1SS1ON EQUIPMENT

The aniper taam determinea the type end quantity of equipment to be carried by a METT-T anaiysia. A aniper team, due to unique miaaion requirementa, oniy carriea miasion-eaaential equipment. Thia ia only a partiai iiating. See Appendix M for a detailed listing.

Each aniper team ahould be equipped with the following:

- M24 SWS (with 100 rounds ammunition M118 or N852).
- Sniper'a dsta book, miaaion logbook, range cards, wind tablea, and alope dope.

- M21 SWS/LSR/service rifle (w/NVD as appropriate) (with 200-210 rounds ammunition).

- M49 20x spotting scope with M15 tripod (or equivalent 15-20x fixed power scope, or 15-45x zoom spotting scope).

- Binoculars (preferably 7 x 50 power with mil scale).

- M9/Service pistols (with 45 rounds 9mm ball ammunition).

- Night vision devices (as needed).

- Radio(s).

- Camouflaged clothing (constructed by the sniper).

- Compass (the M2 is preferable).

- Watches (sweep second hand with luminous dial and water-proof).

- Maps/sector sketch material.

- M18A1/M67/CS grenades (as needed).

- Special mission equipment.

Additional Equipment

There is no limit to the diversity of equipment that the sniper may use for normal or special missions. The key to proper selection of equipment is a careful mission analysis, and to take only what is necessary for the mission. Too much equipment can seriously hamper the sniper's mobility, endurance, and stealth. Recommended additional equipment:

- Sling. The standard issue web sling or leather sling is used by the sniper to aid in firing the rifle if a solid rest is not available. However, the leather sling should be the primary sling used. The web sling is not suitable for sling-supported positions.

- Uniform. In most cases, snipers will use more sophisticated camouflage than most soldiers. Due to their methods of employment, snipers rely heavily on camouflage for protection.

- Ghillie suit. The ghillie suit is a camouflage uniform that is covered with irregular strips of colored burlap or similar material. These strips are folded in half and sewn mainly to the back, legs, arms, and shoulders of the suit. The strips are then frayed or cut to give the suit the appearance of vegetation. A close-mat veil can be sewn to the back of the neck and shoulders of the suit and draped over the head when needed. The veil will help

braak the outline of the head and conceal the lens of the teleacope, ejecting braaa caaea, etc..

When deploying with ragular troops, anipers should wear the uniform of thoae personnel. Wearing an item auch as the ghillie auit will apotlight the anipera in contraat with the regular troops and make them a prime target to the enemy, eapecially enemy anipera

o Watch. There are aeveral typea of military wriatwatches that have a "luminoua dial" or face. The preciae time ia important to the aniper for intelligence reportiog and miaaion planning. Watchea can be uaed for orientation and direction finding if the compaaa ahould become inoperative. Watchea can help to judge dia-tance by aound uaing the "crack-thump" or "flaah-bang" methods.

o Compaaa. Snipera will employ the compaaa in conjunction with the map to aid in orientatioo. They may uae the M2 compaaa rather than the etandard lanaatic compaaa. The M2'a ability to maaaura aoglea ia uaeful, particularly in urban terrain. Additionally, the mirror cao be uaed aa an improviaed periacope for looking around or over obataclea or for aignaling.

o Maintenance equipment. During miaaiona of ahort duration, anipera may opt to leave maintenance equipment in the rear. However, for miaaiona of long duration or diatance thia equipment muat be taken. Maintenaoce equipment can include itema auch aa weapoo and optical cleaning equipmeot for ahort miaaiona, or it can include toola and replacement parta for miaaiona in protracted environmenta auch aa FID or UW oparationa. The amount and type of mainteoaoce equipment that ia needed will alao be governed by aupport maintenaoce available in any given operation area. Due to the match quality of the M21 aniper weapon, any maintenance beyond the organizational level ahould be parformed by a qualified national match armorer.

o Communicationa. Tbe diverairy of communications equipmant available to anipera ia extensive. Selection conaiderationa ioclude: tranamiaaion range, multiple frequenciea, aecure operationa, and portability.

o Meaauring Ruler. A atandard 10 to 25 foot metal carpenter'a tape ruler allowa the aniper to meaaure items in hia oparational area. Thia information may be incorporated into his "cheat book."

o Calculator. Tbe aniper team needs a pocket-size calculator to calculate diatancea when uaing the mil-relation formula. Solar-powered calculatora usually work fine, but under limited viaibility conditiona, bettery power may be preferred. If a battery-powered calculator ia to be used in low-light conditiona, it ahould have a lighted display.

o Other items. Knives, bayonets, entrenching tools, wire cutters, pruning shears, and rucksacks, will be employed as the mission and common sense dictate. The sniper team is best qualified to determine which particular items will be carried for each given mission.

2-7. SPECIAL MISSION EQUIPMENT

Special Weapons

Special weapons include any weapons that are designed for a specific purpose or employed to meet specific mission requirements. Because of the sniper's mission, special weapons should possess three basic characteristics: durability, simplicity, and accuracy. The weapons must be durable enough to withstand the conditions encountered in combat, simple enough to minimize failure, yet accurate enough for sniping. The weapons should be capable of grouping consistently into two MOA out to 600 meters (approximately a 12-inch group). The accuracy of special weapons may be improved by various modifications to the weapons themselves and/or selection of certain types of ammunition. Examples of special weapons:

o Bolt-action target rifles.

o Foreign sniper weapons (procured out of need, compatibility, or to provide a foreign "signature").

o Large-bore, long-range sniper rifles.

o Telescope-mounted handguns (e.g., XP100 or the Thompson Center Contender), for easy concealment or use as light multimission SWSs.

o Suppressed weapons.

Suppressed Weapons

The suppressor is a device designed to deceive observers forward of the sniper as to the exact location of the weapon and the sniper. It accomplishes this by disguising the signature in two ways. First, it reduces the muzzle blast to such an extent that it becomes inaudible a short distance from the weapon. This makes the exact sound location extremely difficult, if not impossible to locate. Secondly, it suppresses the muzzle flash at night making visual location equally difficult. This is critical during night operations.

Noise Sources. When a rifle, or any high muzzle velocity weapon is fired, the resulting noise is produced by two separate sources. Depending on distance and direction from the weapon, the two noises may sound as one or as two closely spaced different sounds. These sounds are the muzzle blast and the ballistic crack, or sonic boom, produced by the bullet.

The muzzle blaat ia ganerated by the blaat wave created by the high valocity gaaaa aacaping into the atmoaphere behind the bullet. Thia noiae ia ralatively eaay to locata aa it emanataa from a aingle, fixed point.

Balliatic crack raaults from the auperaonic apeed of the bullet which compreasea the air ahead of it exactly in the aame fashion aa a auperaonic jet createa a aonic boom. The only diffarence ia that tha amaller bullet producea a aharp crack rather than a large overpreaaure wave with ita reaulting louder ahock wave.

Unlike the muzzle noiae which emanates from a fixed point, tha ballistic crack radiates backwards in a conical ahape aimilar to a bow wava from a boat, from a point alightly ahead of the moving bullet. Thua, the aonic boon creatad by the auparaonic bullet movea at tha velocity of the bullat away from the muzzle noiae and in the diraction of the targat. Location and idantification of the initial aource of the ahock wave ia axtremely difficult bacauae the moving wave atrikes tha aar at nearly 90 degreea to the point of origin. Attention ia thua drawn to tha direction from which tha wave ia coming rathar than towarde tha initial aource, tha firing poaition (Figure 2-7-1).

Spacial Surveillance Devicaa

In aome ciroumetancaa, anipere may employ apaciel aurveillance davicee in thair miaaion. Employment of thie apacial aquipmant will normally involva added waight and bulk that will limit the anipar'e mobility. Exemplaa of auch devicaa include, but ara not limited to, tha following:

o Unartl 100 mm taam apotting acope. Thia apotting acope ia a atandard taam acopa for moat marksmanahip unita and ahould ba uaed for aniper training purpoaea. The acopa'a inoraaaad field of view will greatly enhance the taam'a obaarvation capability in atatic poaitiona.

o Crew-aerved NVDs. Theaa devicea are commonly employed in conjunction with craw-aerved weapona (aa typified by the AN/TVS-5) or night obaervation (typified by the AN/TVS-4). They offer a aignificant advantage over their amaller counterparta in aurveillance, target acquiaition, and night observation (STANO). Howaver, their waight and bulk normally limit their use to atatic operations.

o Thermal imagery. Thermal imagery ia a relatively new tool available to the aniper team. Equipment auch aa the AN/PAS-7 offera a thermal imagery device in a portable package. Thermal imagery can enhance STANO operationa when employed with more conventional equipmant, or it can provide continuoua aurveillance when ambient light conditinna (auch aa atarlight and moonlight) do not exist for light-intenaification devices.

- Radars and sensors. Just as the sniper's surveillance operations should be integrated into the overall surveillance plan, the sniper should strive to make maximum use of any surveillance radars and sensors in the area of operation. Snipers will not normally employ these items themselves, but through coordination with using or supporting units. The snipers may be able to use the target data that the radars and sensors can acquire. However, it must be kept in mind that these devices are subject to human error, interpretation, and enemy countermeasures. Total reliance on their intelligence could prove detrimental or misleading.

2-8. CARE AND CLEANING OF THE SNIPER WEAPON SYSTEMS

Maintenance is any measure taken to keep the system in top operating condition. It includes: inspection, repair, cleaning, and lubrication. Inspection reveals the need for repair, cleaning, or lubrication. A weapon, sheltered in garrison and infrequently used, must be inspected often to detect dirt, moisture, and signs of corrosion, and it must be cleaned accordingly. A weapon in use and subject to the elements, however, requires no inspection for cleanliness, since the fact of its use and exposure is sufficient evidence that it requires repeated cleaning and lubrication. The sniper couples his cleaning with a program of detailed inspection for damage or defect.

Rifle maintenance tools and supplies:

- One-piece plastic-coated .30 cal cleaning rod with jag (36").
- Bronze bristle bore brushes (.30 and .45 calibers).
- Cleaning patches (small and large sizes).
- Shooter's Choice Bore Solvent (Carbon cleaner), ("SCBS").
- Sweets 7.62 Copper Remover (Copper cleaner), ("SWEETS") (Shooter's Choice Copper Remover is the second choice).
- Shooter's Choice "Rust Prevent".
- Cleaner, Lubricant, Preservative ("CLP").
- Rifle grease.
- Bore guide (long action).
- Q-tips.
- Pipe cleaners.

- Medicine dropper.
- Shaving brush.
- Tooth brush.
- Pistol cleaning rod.
- Rags.
- Camel hair brush.
- Lens paper.
- Lens cleaning fluid (denatured or isopropyl alcohol).

When to clean the rifle:

Before firing. The rifle must always be cleaned prior to firing. Firing a weapon with a dirty bore or chamber will multiply and speed up any corrosive action. Oil in the bore and chamber of even a clean rifle will cause pressures to vary and first-round accuracy will suffer. Clean and dry the bore and chamber prior to departure on a mission and use extreme care to keep the rifle clean and dry en route to the objective area. Firing a rifle with oil or moisture in the bore will cause a puff of smoke that can disclose the firing position.

After firing. The rifle must be cleaned after it has been fired, because firing produces deposits of primer fouling, powder ashes, carbon, and metal fouling. Although modern ammunition has a non-corrosive primer which makes cleaning easier, the primer residue can still cause rust if not removed. Firing leaves two major types of fouling that requires different solvents to remove: carbon fouling and copper jacket fouling. The rifle must be cleaned within a reasonable interval--a matter of hours--after cessation of firing. Common sense should preclude the question as to the need for cleaning between rounds. Repeated firing will not injure the weapon if it was properly cleaned before the first round.

The M24 SWS will be disassembled only when absolutely necessary, not for daily cleaning. An example of this would be to remove an obstruction that is stuck between the stock and the barrel. When disassembly is required, the recommended procedure is:

- Place the weapon so that it is pointing in a safe direction.
- Ensure the safety is in the "S" position.
- Remove the bolt assembly.

- Loosen the mounting ring nuts (2) (Figure 2-8-1) on the telescope and remove the telescope.

- Remove the action screws (2) (Figure 2-8-2).

- Lift the stock from the barrel assembly (Figure 2-8-3).

- For further disassembly, refer to TM 9-1005-306-10.

Cleaning procedure

- Lay the rifle on a cleaning table or other flat surface with the muzzle away from the body and the sling down. Make sure not to strike the muzzle or telescopic sight on the table. The "MTM" cleaning cradle is ideal for holding the rifle.

- Always clean the bore from the chamber toward the muzzle, attempting to keep the muzzle lower than the chamber to prevent bore cleaner from running into the receiver or firing mechanism. Be careful not to get any type of fluid between the receiver and the stock. If fluid does get between the stock and receiver, the receiver will actually "slide" on the bedding every time the rifle recoils, thereby decreasing accuracy and increasing wear and tear on the receiver and bedding material.

- Always use a bore guide to keep the cleaning rod centered in the bore during the cleaning process.

- First, push several patches saturated with SCBS through the barrel to loosen the powder fouling and begin the solvent action on the copper jacket fouling.

- Saturate the bronze bristle brush (NEVER USE STAINLESS STEEL BORE BRUSHES--THEY WILL SCRATCH THE BARREL!) with SCBS (shake bottle regularly to keep the ingredients mixed) using the medicine dropper to prevent contamination of the SCBS. Run the bore brush through a MINIMUM of 20 times. Ensure that the bore brush passes completely through the barrel before reversing its direction, otherwise the bristles will break off.

- Using a pistol cleaning rod and a .45 caliber bore brush, clean the chamber by rotating the patch-wrapped brush 8 to 10 times. DO NOT scrub the brush in and out of the chamber.

- Push several patches saturated with SCBS through the bore to push out the loosened powder fouling.

- Continue using the bore brush and patches with SCBS until the patches come out without traces of the black/gray powder fouling and are becoming increasingly green/blue. This indicates that the powder fouling has been removed, and that only the copper fouling remains. Remove the SCBS from the barrel with several

clean patchee Thia ia important because the different solvents ahould never be mixed in the berrel.

o Push several patchea aeturated with SWEETS through the bore, using a scrubbing motion to work the aolvent into the copper. Let the solvent work for 10-15 minutes (NEVER LEAVE SWEETS IN THE BARREL FOR MORE THAN 30 MINUTES!)

o While waiting, acrub the bolt with the toothbrush moiatened with SCBS and wipe down the remaindar of the weapon with a cloth.

o Puah eeverel patches aaturated with SWEETS through the barrel. They will appeer dark blue at first, indicating the amount of copper fouling removad. Continue thie process until the aaturated patchaa come out without the trace of blue/grean. If the patchas continue to come out derk blue after aeverel traetments with SWEETS, use the bronze brush aeturated with SWEETS to incresse the scrubbing action. Be sure to cleen the bronze brush thoroughly afterwarde with hot running water ("Quick Scrub Cleener/Degreaser" is preferrad) as the SWEETS acts upon its bristles as well.

o When the barrel is completely clean, dry it with several tight fitting patches. Aleo, dry out the chamber using the .45 brush with a patch wrapped eround it.

o Run a patch aeturated with Shooter's Choice Rust Prevent (<u>not</u> CLP) down the barrel and chamber if the weapon is to be stored for any length of time. Steinlese eteel berrels are not immune from corroeion. Be eure to remove the preservative by running dry patches through the bore and chamber prior to firing.

o Plece a small amount of rifle greese on the reer aurfeces of the bolt lugs. This will prevent galling of the metal eurfeces.

o Wipe down the complete weapon exterior (if it is not covered with camouflage peint) with a CLP-aaturatad cloth to protect it during storege.

<u>M21 Care and Maintenance</u>

Extreme cere hee been used in building this sniper rifle. A similar degree of attention muat be devoted to its deily cera and maintenance.

Tha rifle should not be disaaaembled by the enipar for normel cleaning and lubricetion. Diaaasembly should be performed only by the armorer during acheduled inspectiona or repair, and it will be thoroughly cleened and lubriceted at thet time.

The recommended procedure for cleaning and lubricating the rifle is similar to tha M24 with the following additions:

- The bore is claaned from the muzzle end of the barrel, so extra care muat be takan during cleaning. A sstisfactory muzzle guide can ba mada from an expended 12 gauge shotgun ahell, with the primer pocket drilled out end poliahed to fit the one-piece, plastic-coated cleening rod.

- Claan tha racaiver, other interior arees, end the flaah auppressor with e tootb bruah, reg, end patchea.

- Do not put bore cleaner in the gas port! It will increase carbon buildup end reatrict fraa movament of the gsa piston.

- Bafora firing, lubricate the rifle by placing a light coat of graase on the oparating rod handle track, camming aurfacaa in the hump of the operating rod, the bolt'a locking lug track, and in batwaan tha front bend lip of tha gaa ayatem and tha matal bend on tha lower front of the stock.

Barrel Break-in Procedure

To maximiza barrel lifa, accuracy, end minimize tha claaning requirement, tha following barrel break-in procedure must be used. This procedure is best done when tha SWS is new or newly rebarraled. The break-in parind "laps in" tha barrel by polishing tha barrel surfece under heat end pressure. The barrel must first be clesned completely of all fouling, both powder end copper. The barrel is dryad, and ona round ia firad. Tha barral ia than completely claanad uaing Shooter's Choice Solvant and then Sweat'a 7.62 copper remover. Again, the barrel must be completely clesned. Another round is fired. Thia procedure of firing one ahot, than cleaning, etc. must ba dona for e total of 10 rounda. After the 10th round, the SWS is then teated for groupa by firing thraa (3) round ahot groups, with e complata barrel claaning between ahot groups for e totel of fiva ahot groups (15 rounds totel). Tha barrel is now broken in, and will provide superior accuracy end e longer usabla barral lifa. Additionally, the barral will be aasiar to claan bacauaa the surfece ia amoother. Again, the barrel should be clesned et least every 50 rounds to maximize barrel life.

Storage

The M24 end M21 SWSs should be stored as follows:

- Clear tha SWS, cloaa the bolt, and aquaaze tha triggar.

- Open tha lena caps to prevent gathering of moiature.

- Hang the weapon upside down by the rear sling swivel.

- Placa all othar items in the ayatem caaa (M24).

- Trensport the weapon in the system case during non-tactical situations.

- Protect the weapoa st all times durıag tactical movement.

Opticsl Equipmsat Maiateaaace

Dirt, rough hsndling, or abuse of optical equipment will result in insccurscy snd malfunctioa. Whea not in use, the rifle snd acope should be ceaed, aad the leases should be capped

Clssning ths Lsasss

Lenses are coated with a special magnesium fluoride reflection-reducing material. The coat is very thin and great cars ia rsquired to prevent damage to it.

To remove dust, liat, or other foreiga mattsr from the lena, bruah it lightly with a cleaa camel hair brush.

To rsmove oil or greaae from the optical aurfaces, apply a lena tiesue with a drop of lena clesning fluid or rubbing alcohol. Carefully wipe off the lens aurfsce in circular motiona, from the center to the outaide edge. Dry off the lena with a clean lena tissue. In the field, if the proper aupplies are not available, breath heavily on the glaaa and wipa with a aoft, claan cloth.

Handling Telescopes

Telaacopes are delicate inatrumenta and muat be handled with care. The following precautiona will prevent damage:

- Chack and tightan all mounting acrewa periodically and alwaya prior to an operation. Ba careful not to changs coarae windage adjuatment.

- Keep lenaea free from oil and graaaa and navar touch them with the fingara. Body greasa and perapiration injurs them. Keep lenaea cappsd.

- Do not force elevation and windage acrawa or knoba.

- Do not allow the telescope to remain in direct aunlight, snd avoid letting the aun'a raya shine through the lsns. Lenaea magnify and concentrate sunlight into a pinpoint of intenae hsat which is focused on ths mil acale reticle. This may melt the mil dots sad damage the tslescope iaterasily. Keep the lenaes covered and the entire telsscope covered whsa aot firing or observing

- Avoid dropping the telescope or atriking it with another object. This could damsge it severely aad permanently, as well as change the zero.

- To svoid damage to the telescope or any other aniper equipment, the anipers or armorera should be the only peraonnel handling the equipment. Anyone who doea not know how to use thie equipment properly could csuae damage.

Maintenance and Care in Cold Climates

Rifle. In temperaturea below freezing, the rifle muat be kept free of moisture and heavy oil, both of which will freeze, causing working parts to freeze or operate aluggishly. The rifle ahould be stored in a room with the temperaturm equal to the outaide temperature. If the rifla ia takan iato e warm araa, condanaation will occur, thus requiring a thorough cleaning and drying before being taken into the cold. Otherwiae, the condensation will cauae icing on exposed metal parts and optics.

Tha firing pin should be disassembled and claanad thoroughly with a degreasing agent. It should then be lubricated with CLP. Rifle grease will harden end causa the firing pin to fall sluggishly.

On weapons with wood atocks such as the M21, the atock muat be sealed with danish oil or tha aquivalent. If moiature gata into ths wood, then freezaa, the atock will crack.

Optical Equipment. In extreme cold, cars must be takan to avoid condansation and ths congaaling of oil on ths glass.

If not excessiva, condensation can bs removed by placing ths instrument in a warm place. Concentratad haet muet not bs applied, because it will causs expeneion end damags. Moisturs may eleo be blotted from ths optics with lens tiesus or a soft, dry cloth.

In cold tamparatures, oil will thicken and cauee eluggish opsretion or failure. Focusing parts ere particularly sensitive to freezing oils. Brsathing will form frost, eo ths optical surfacse must be cleansd with lens tissue, preferebly dampsnsd lightly with alcohol. Do not, bowever, epply ths elcohol dirsctly to ths glass.

Maintenance and Care after Salt Water Exposure

Rifle. Salt water and salt water atmoaphere heve extrems and very rapid corrosiva affects on metal. During pariods of this exposure, the rifle muat be checked frequently and cleanad aa oftan as possible, even if it means only lubricating the weapon. The weapon should always be well lubricated, including the bore, except when actually firing. Beform firing, always run a dry patch through the bore, if possible.

Maintenance and Care during Jungle Operations (High Humidity)

Rifle.

Uaa more lubricant.

Keep the rifla casad when not in use.

Protect from rain and moiature whenever possible.

Keep ammunition clean and dry.

Claan rifla, bors, and chamber daily.

Kaep the telescope capa on when not in use. If moiature or fungua davelopa inside the talescope, get a replacement.

Cleen and dry the stock daily.
Dry the carrying ceee end rifle in the eun whenever poeeible.

Maintenence end Cere during Deeert Operetions

Rifle.

Keep the weepon completely dry and free of CLP and greeee except on the reer of the bolt luge.

Keep the rifle free of eend by use of e carrying eleeve or the caee when not in uee.

Protect the weepon by ueing e wrep. Slide the wrap between the etock end berrel then croee over on top of the ecope, croee under the weepon (over magazine) end secure. The weapon cen etill be pleced into immediete operetion but ell criticel parte ere covered. The seeled hard ceee is preferred in the deeert if the eituetion permite.

Keep the teleecope protected from the direct reye of the eun.

Keep ammunition cleen end protected from the direct reye of the eun.

Uee e toothbrueh to remove eend from the bolt end receiver.

Cleen the bore end chamber daily.

Protect the muzzle end receiver from blowing eend by covering with e cleen cloth.

To protect the free-floating barrel of the weepon, teke en 8- or 9-inch etrip of cloth end tie e knot in each end. Before going on e mieeion, elide the cloth between the berrel end etock ell the wey to the receiver end leeve it there. When in poeition, elide the cloth out, teking ell reetrictive debrie end eend with it.

Maintenance and Care, Hot Climate and Salt Water Exposure

Optical Equipment.

Optice ere eepecielly vulnerable to bot, humid climetee end eelt weter etmoephere.

Sun reye. Opticel equipment muet NOT be expoeed to direct eunlight in e hot climete.

Rumidity end eelt eir. In theee environmente, the optical inetrumente muet be inepected end cleened frequently to evoid ruet end corroeion. A light film of oil is beneficiel.

Perepiretion. Perepirstion from the bande ie e contributing fector to rueting. After being handled, inetrumente must be thoroughly dried end lightly oilsd.

2-9. TROUBLESHOOTING THE SNIPER WEAPON SYSTEMS

If e weepon malfunction occurs, the following liets indicete the poeeible malfunctione end corrsctive ectione.

M24 Malfunctione and Correctione

The following liet doee not reflsct ell malfunctione thet may occur, or all caueee end corrective ections. If e malfunction ie not correcteble, the complete weapon eyetem muet be turned in to

the proper maintenance/supply channel for return to the contractor (see shipment, TM 9-1005-306-10).

Malfunction	Cause	Correction
Fail to fire	Safety in "S" position	Move safety to "F" position
	Defective ammunition	Eject round
	Firing pin damaged	Change firing pin assembly
	Firing pin binds	Change firing pin assembly
	Firing pin protrudes	Change firing pin assembly
	Firing control out of adjustment	Turn complete system in to the maintenance/supply channel for return to contractor
	Trigger out of adjustment	Turn in as above
	Trigger does not retract	Turn in as above
	Trigger binds on trigger guard	Turn in as above
	Firing pin does not remain in cocked position with bolt closed	Turn in as above
Bolt binds	Action screw protrudes into bolt track	Turn in as above
	Scope base protrudes into bolt track	Turn in as above
Fail to feed	Bolt override of cartridge	Seat cartridge fully rearward in magazine
	Cartridge stems chamber	Pull bolt fully rearward; remove stemmed cartridge from ejection port area; reposition cartridge fully in the magazine
	Magazine in backward	Remove magazine spring, and reinstall with long leg follower
	Weak or broken magazine spring	Replace spring

Fail to eject	Broken ejector	Turn the complete weapon system in to the maintenance/ supply channel for return to contractor
	Fouled ejector plunger	Inspect and clean bolt face; if malfunction continues, turn in as above
Fail to extract	Broken extractor	Turn in as above

M21 Malfunctions and Corrections

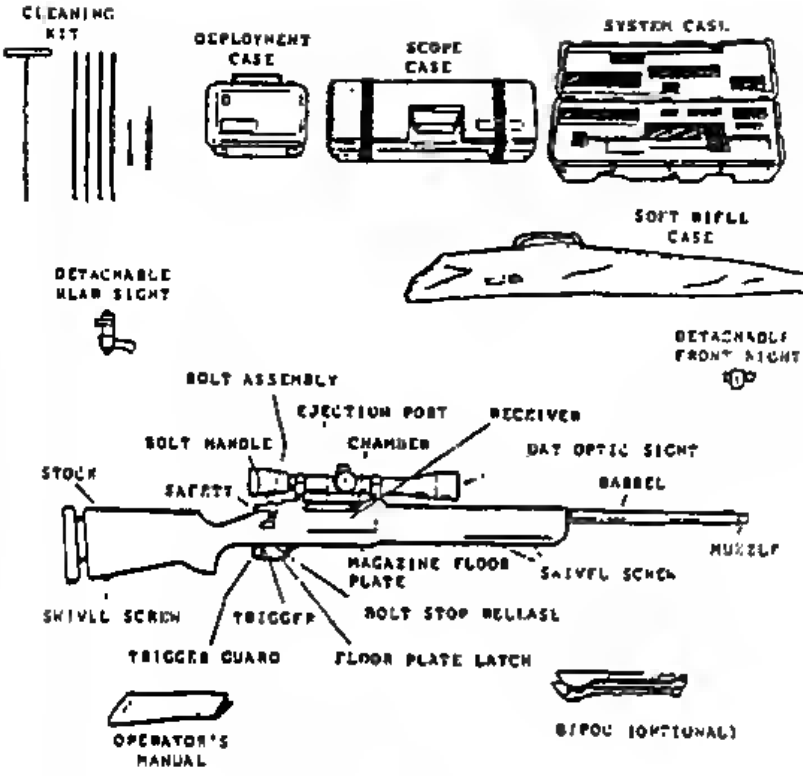
The following, lists pertinent information for the operator. If the weapon becomes unserviceable, it must be turned in for service by a school-trained National Match armorer.

Malfunction	Cause	Correction
Failure to load	Dirty or deformed magazine	Clean or replace
	Damaged magazine tube	Replace magazine
	Dirty magazine	Clean
	Damaged or broken magazine spring	Replace magazine
	Damaged or broken follower	Replace magazine
	Loose or damaged floor plate	Replace magazine
Magazine inserts with difficulty	Bent or damaged magazine	Replace magazine
	Excessive dirt in receiver	Clean
	Round not completely seated in magazine	Remove round; insert properly
	Deformed or operating rod spring guide	Evacuate to authorized armorer
	Damaged magazine latch	Evacuate to authorized armorer
	Magazine latch movement restricted	Check movement; if necessary; if bent or distorted, evacuate to authorized armorer
Magazine not retained in weapon	Magazine latch damaged	Evacuate to authorized armorer
	Magazine latch spring damaged	Evacuate to authorized armorer

	Magazine latch plate damaged or miaaing	Replace magazine
	Deformad or damaged operating rod apring guide	Evacuate to authorized armorer
	Locking receaa at top front of magazine deformed	Replnce mngazine
	Magazine not fully inatalled	Remove; inatall corractly (make aura latch clicka)
Fail to feed	Waak or brokan apring	Raplace magazine
	Damagad magazina	Raplaca magazine
	Damagad or deformed atripping lug on bolt	Evacuata to authorizad armorar
	Short recoil	Saa ahort racoil
	Dirty ammunition and/or magazina	Clean ammunition and/or magazina
	Waak or brokan operating rod apring	Evacuata to authorizad armorar
	Raatrictad movement of, or damagad operating rod	Evacuata to authorizad armorer
Bolt faila to cloaa tightly	Cartridga caaa holding bolt out of battary	Pull bolt aaaambly to raar and ramova deformed cartridga; claan ammunition and/or barral and chamber
	Dirty chamber	Claan chamber
	Extractor doea not anap over rim of cartridga caaa	Evacuate to authorizad armorer
	Frozan or blocked ajactor apring and plunger	Evacuata to authorizad armorer
	Restricted movement of, or damaged operating rod apring	Evacuate to authorized armorer
	Bolt not fnlly rotatad and lockad in racaivar	Evacuata to authorizad armorer
	Weak or broken oparating rod apring	Evacuate to authorized armorar
	Damaged receiver	Evacuate to authorized armorer

Fail to fire	Bolt not fully locked	(See bolt fails to move forward and close tightly)
	Defective ammunition	Replace ammunition
	Firing pin worn, damaged, or movement restricted	Evacuate to authorized armorer
	Broken hammer	Evacuate to authorized armorer
	Weak or broken hammer spring	Evacuate to authorized armorer
	Hammer and trigger lugs or sear worn or broken, causing hammer to ride the bolt assembly forward	Evacuate to authorized armorer
Short recoil	Gas plug loose or missing	Tighten plug if loose; evacuate to authorized armorer if missing
	Restricted movement of operating rod assembly	Evacuate to authorized armorer
	Bolt binding	Clean
	Gas cylinder lock not fully installed	Evacuate to authorized armorer
	Gas piston restricted	Evacuate to authorized armorer
	Damaged connector assembly	Evacuate to authorized armorer
	Partially closed spindle valve	Evacuate to authorized armorer
	Defective ammunition	Replace ammunition
Fail to extract	Spindle valve closed	Evacuate to authorized armorer
	Cartridge seized in chamber	Remove
	Short recoil	(See short recoil)
	Damaged or deformed extractor	Evacuate to authorized armorer
	Weak, deformed or or frozen extractor plunger assembly	Evacuate to authorized armorer
	Ruptured or separated cartridge	Evacuate to authorized armorer

Fail to eject	Short recoil	(See short recoil)
	Weak, deformed or frozen extractor plunger assembly	Evacuate to authorized armorer
Fail to hold bolt rearward	Damaged or deformed magazine follower	Replace magazine
	Damaged bolt lock	Evacuate to authorized armorer
	Bolt lock movement restricted	Evacuate to authorized armorer
	Weak or broken magazine spring	Replace magazine


CLEANING KIT
DEPLOYMENT CASE
SCOPE CASE
SYSTEM CASE
SOFT RIFLE CASE
DETACHABLE REAR SIGHT
DETACHABLE FRONT SIGHT
BOLT ASSEMBLY
EJECTION PORT
RECEIVER
BOLT HANDLE
CHAMBER
DAY OPTIC SIGHT
STOCK
SAFETY
BARREL
MUZZLE
MAGAZINE FLOOR PLATE
SWIVEL SCREW
SWIVEL SCREW
TRIGGER
BOLT STOP RELEASE
TRIGGER GUARD
FLOOR PLATE LATCH
OPERATOR'S MANUAL
B/POD (OPTIONAL)

2-1-1

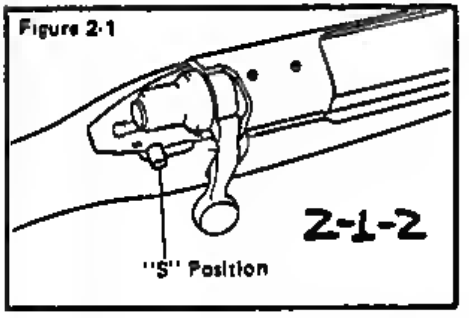
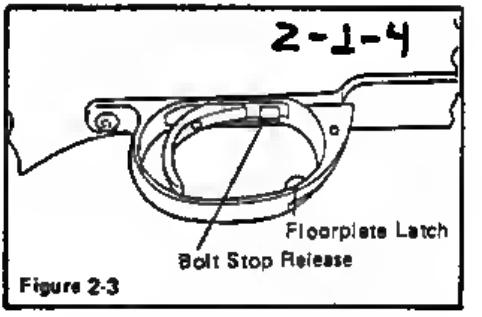


Figure 2-1
2-1-2
"S" Position


2-1-4
Floorplate Latch
Bolt Stop Release
Figure 2-3

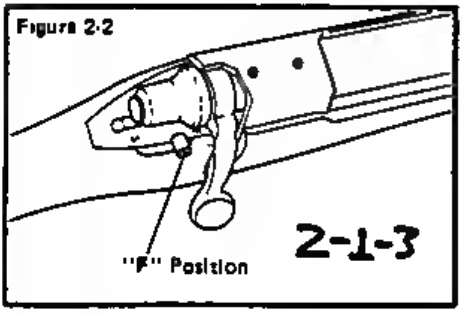
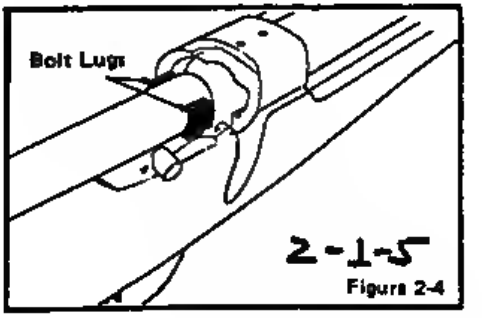
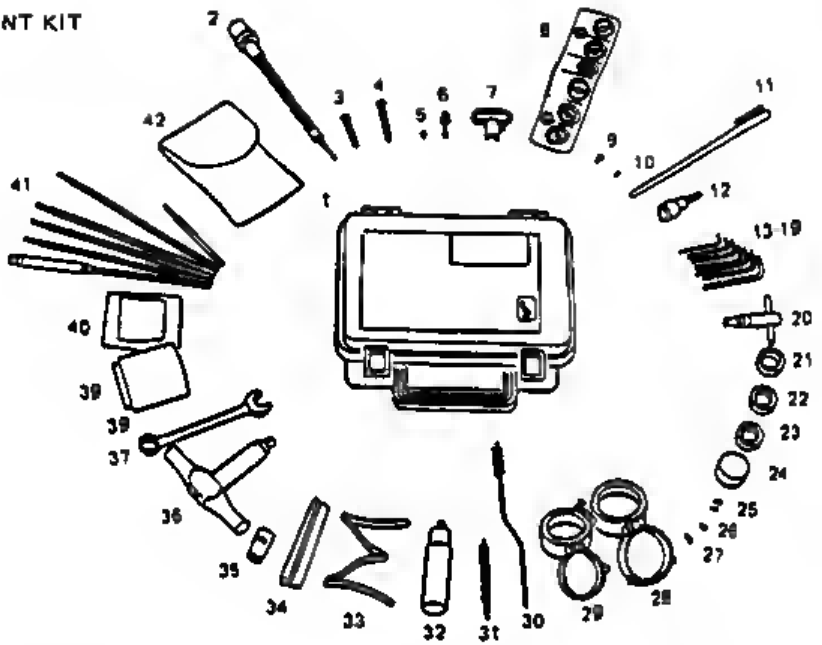


Figure 2-2
2-1-3
"F" Position

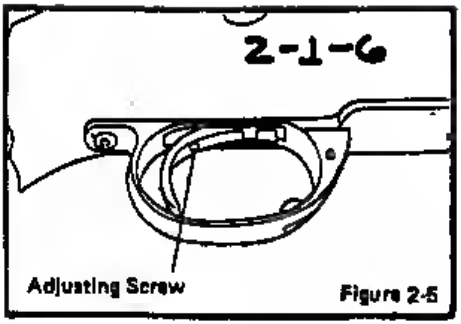

Bolt Lugs
2-1-5
Figure 2-4

DEPLOYMENT KIT



DEPLOYMENT KIT

1	Deployment Case
2	Firing Pin Assembly
3	Front Guard Screw
4	Rear Guard Screw
5	Front Sight Base Screw
6	Swivel Screw
7	Swivel, Sling
8	Front Sight Insert Kit
9	Rear Sight Base Screw
10	Trigger Pull Adj. Screw
11	Brush, Cleaning Small
12	Socket Wrench Attachment 3/8" Drive Hex Bit 5/32"
13	.050" Key, Socket Head Screw
14	1/16" Key, Socket Head Screw
15	5/64" Key, Socket Head Screw
16	3/32" Key, Socket Head Screw
17	7/64" Key, Socket Head Screw
18	1/8" Key, Socket Head Screw
19	5/32" Key, Socket Head Screw
20	T-handle Combo Wrench
21	Day Optic Sight Windage Dial w/ Screws
22	Day Optic Sight Elevation Dial w/Screws
23	Day Optic Sight Focus Dial w/ Screws
24	Day Optic Sight Adj. Dial Dust Cover
25	Day Optic Sight Ring Screws
26	Day Optic Sight Base Screw Front
27	Day Optic Sight Base Screw Rear
28	Day Optic Sight Dust Cover, Front
29	Day Optic Sight Dust Cover Rear
30	Brush, Chamber
31	Brush, Bore
32	Oil Bottle
33	Magazine Spring
34	Magazine Follower
35	Socket, Socket Wrench 1/2"
36	T-Handle Torque Wrench
37	Wrench, Box and Open 1/2"
38	Rear Sight Base Plug Screw
39	Day Optic Sight Sunshade
40	Swabs, Cleaning, Small Arms
41	Cleaning Rod Kit
42	Lens Cleaning Kit


2-1-6
Adjusting Screw
Figure 2-5

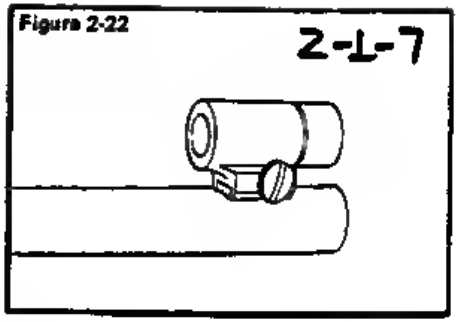
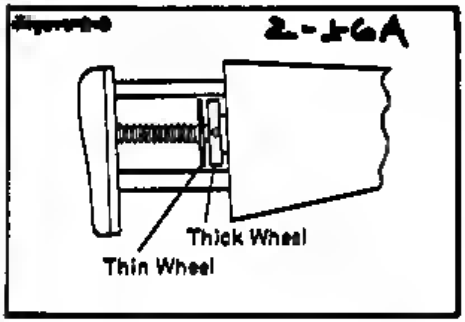


Figure 2-22
2-1-7


2-1-6A
Thick Wheel
Thin Wheel

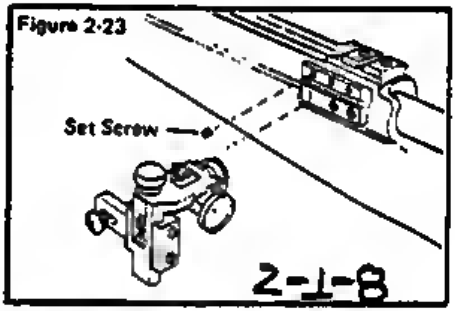
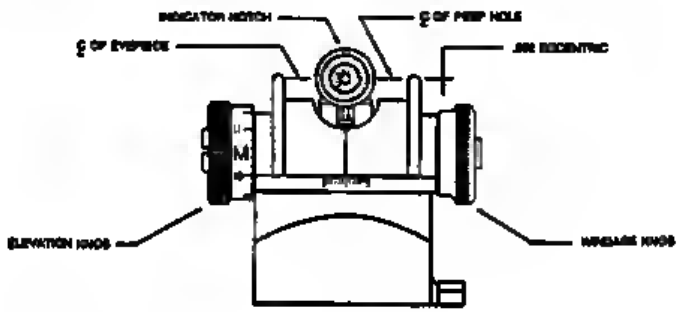


Figure 2-23
Set Screw
2-1-8


2-1-9

2-1-16



1. NATIONAL MATCH REAR SIGHT ASSEMBLY WITH 1/2 MINUTE WINDAGE AND 1/2 MINUTE ELEVATION

a. The two aperture assemblies are identical except for the eyepiece holes have different peep hole diameters. The aperture with .0937 peep hole will be numbered as a sixteen with the .0520 National aperture aperture as an identified

The mounted eyepiece is designed as identified glare and reflections to the sight aperture, has an installed 1/2 minute changes of elevation. Each eyepiece is interchangeable from rear reflector with an identified aperture. In addition the lip overlapped to disassemble the aperture assembly or to change eyepieces on the aperture.

The peep hole is .062 nominally reflector with them identified of the aperture. Stem by the aperture 180° elevation or more-elevation holes and keeps the line of sight. The spring keeps them to the eyepiece engage a sixteen "V" holes at the end of the aperture to retain the eyepiece in each position. The changes of the eyepiece is elevation by a retain at the eyepiece.

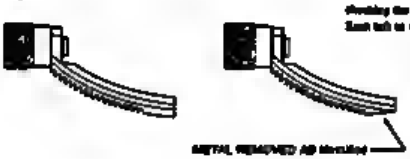
Stem slots of the aperture have given a change of 1 sixteen. Pressing the aperture in the the retainer mark is in the top, rotate the outer of wipes of the holes by 1/2 minute. With the reflector sleeve in the down, plain of wipes of the outer will be sixteen down 1/2 minute.

b. The National Match sight have vertical "WINDAGE" is identified to keeps the mounted aperture. The on peep holes of and right have and of the National minute windage have eyepiece a 1/2 sixteen change in windage for have also of the knob. Then the National Match Rear Sight is marked of 1/2 minute sight changes for both windage and elevation.

c. The National Match front sight the a notch width of .061 minute .002 and is identified by the letters "WM" and the numbers "062" for the right side. The notch of the right blade of the standard M1 or M14 rifle is .064 minute .013.

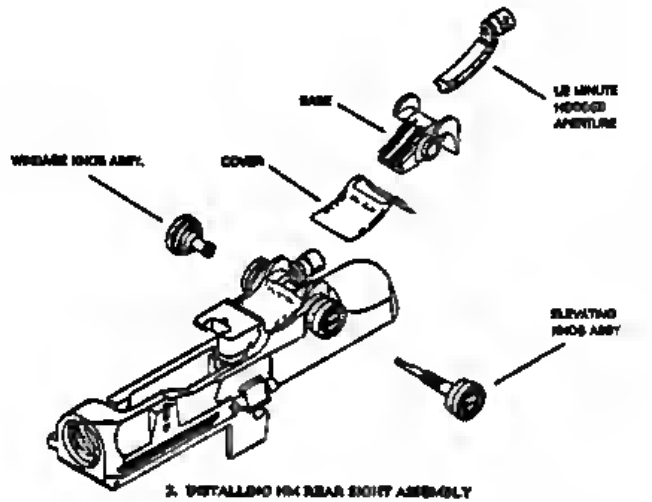
2. FITTING THE NM REAR SIGHT APERTURE

a. Using a test file, carefully and elevation and end of the eyepiece as shown, to test the aperture with the sixteen are in the rear sight receiver well.



b. To fit the aperture to the NM/SA base, the sixteen edges need to be changes in by moving or with a test file. National the same amount to retain from each blade slowly checking the fit often, you were the or for a right to with no play from left to right.

2-1-10



2. INSTALLING HK REAR SIGHT ASSEMBLY

[illegible] must be used in removing the parts. Back the windage knob and rear sight base down a bit more than normal. Portions of the protective metal firearm protector or cushion should be given on the following, prior to, and during assembly:

1. Insert rear sight base knob in the opening of the cover.

2. Place the front lip of base into the recess at the forward portion of rear sight receiver itself. Slide the base slightly, elevating the rear portion of the knob. With a screwdriver, apply pressure to rear of knob in a horizontal direction into the elevation knob [illegible] and is firmly anchored by the forward.

3. Insert the assembly assembly, into the pressure groove in the base and knob base is forward against the receiver.

4. Caution should be exercised in opening windage knob threads and rear sight base so excessive damage of over threading. Moving threads base be free of all foreign matter.

With the left hand, apply pressure on the base forward and to the right of the forward. Insert and base windage knob assembly to engage the elevating threads. Close base in open windage knob base the base is tightly seated against the right receiver slot.

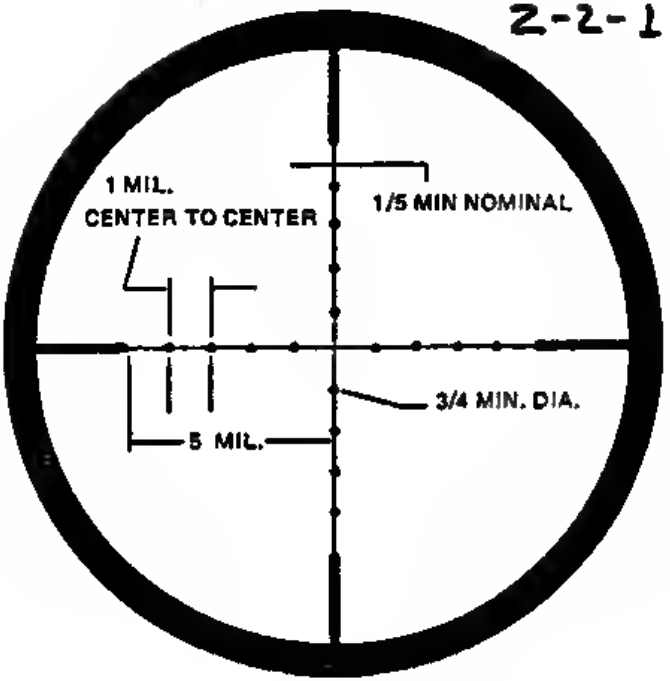
4. Insert pinion of elevating knob assembly through the base on left side of receiver slot, elevating the pinion until with elevating knob of the apparatus. Simultaneously align by feel, the fine in the end of pinion shaft base moving rear sight in the back, slotted in the windage knob. Thread the rear sight slide (in the windage knob) over the pinion shaft (some manufacturers of parts may be necessary to provide assembly). Tighten rear sight and until shaft elevating and windage knobs receiver [illegible]. By backing off clockwise sight and rear of rear knob base until [illegible] shaft knobs will base be [illegible]. The protective base on rear sight base rear of portion and protective knob on the receiver.

5. Tighten the windlight screw opening and tighten slotted screw and [illegible] in knob of the receiver of slots from the raised position of the receiver rear the right the base "seated" in all the respective ranges. Close sight settings base base undefined, the rear sight construction, should up to knob to preserve right time.

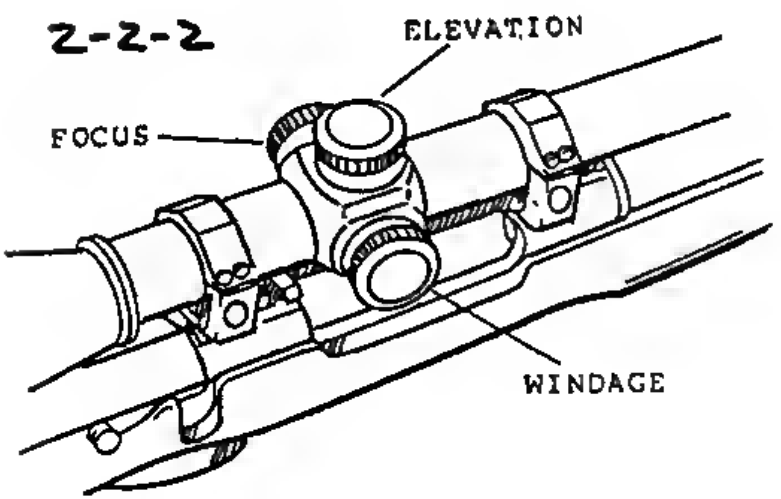
M24 DAY DPTIC SIGHT

TM

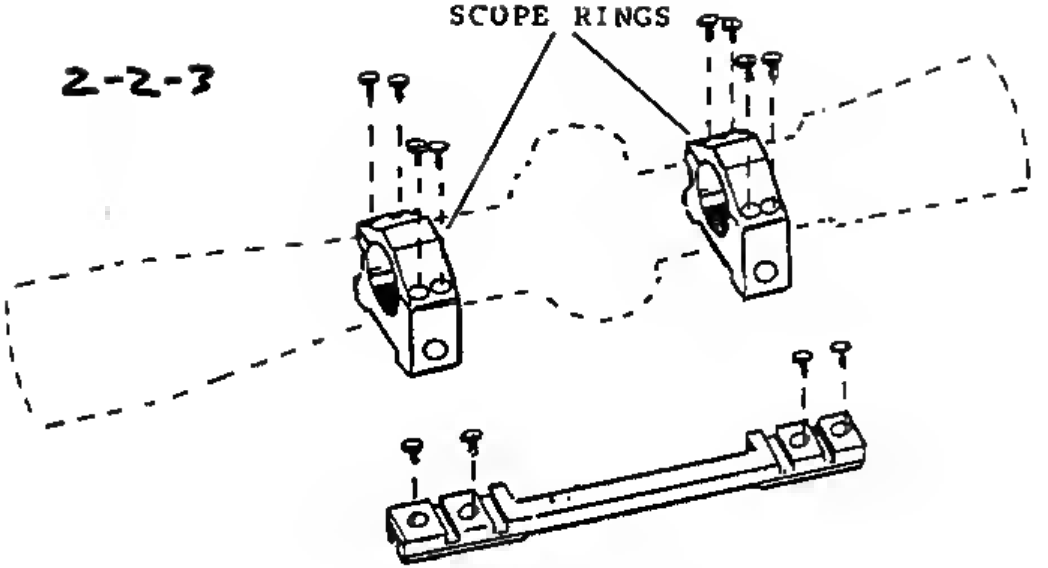
2-2-1

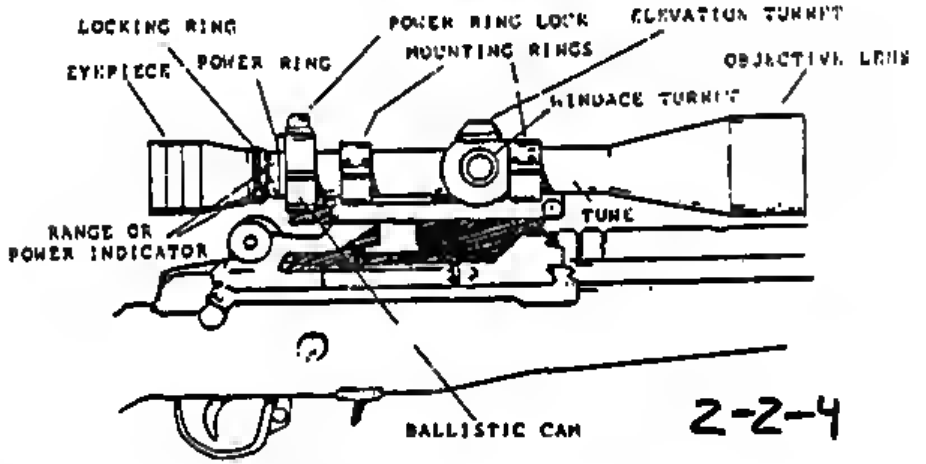


2-2-2

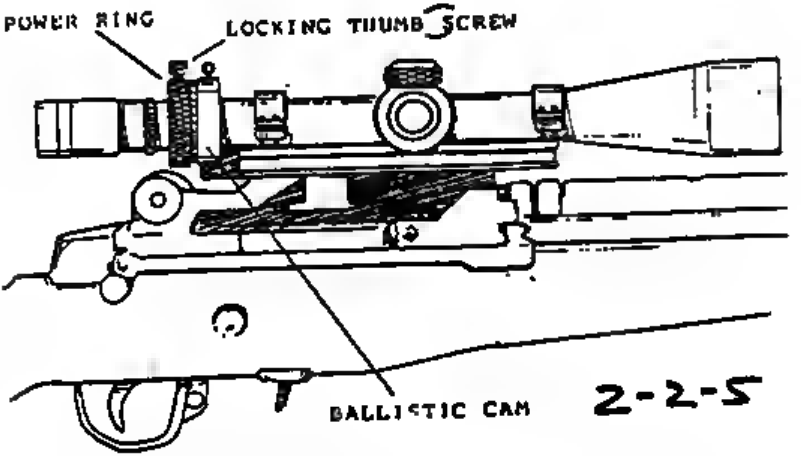


2-2-3

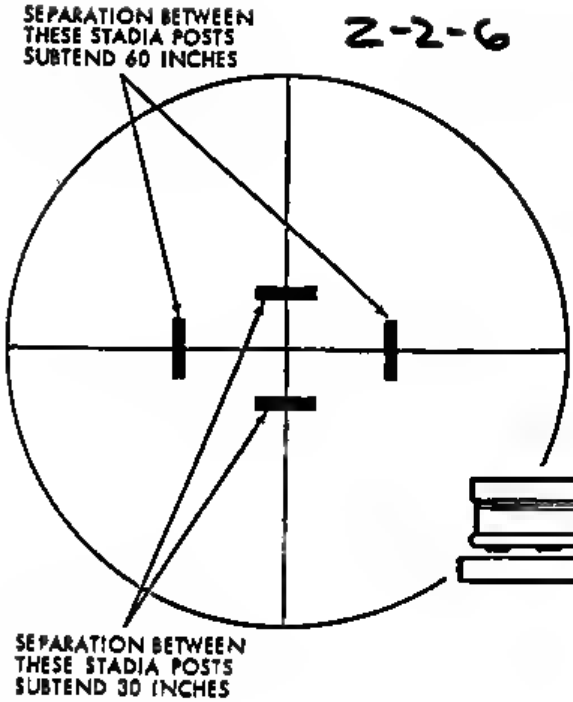

SCOPE RINGS


LOCKING RING
EYEPIECE
POWER RING
POWER RING LOCK
MOUNTING RINGS
ELEVATION TURRET
OBJECTIVE LENS
WINDAGE TURRET
TUNE
RANGE OR
POWER INDICATOR
BALLISTIC CAM

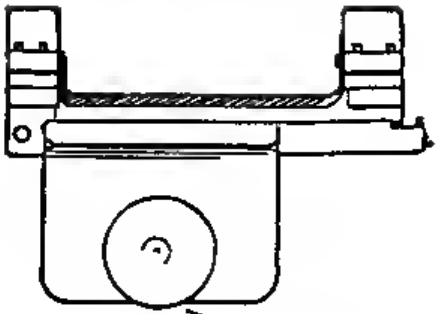
2-2-4


POWER RING
LOCKING THUMB SCREW
BALLISTIC CAM

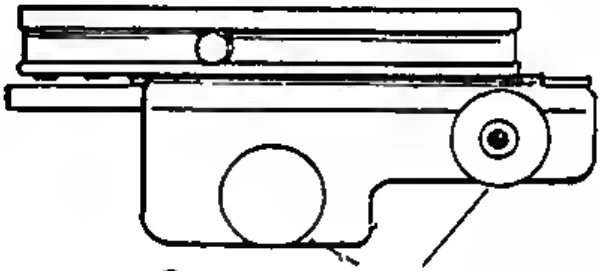
2-2-5



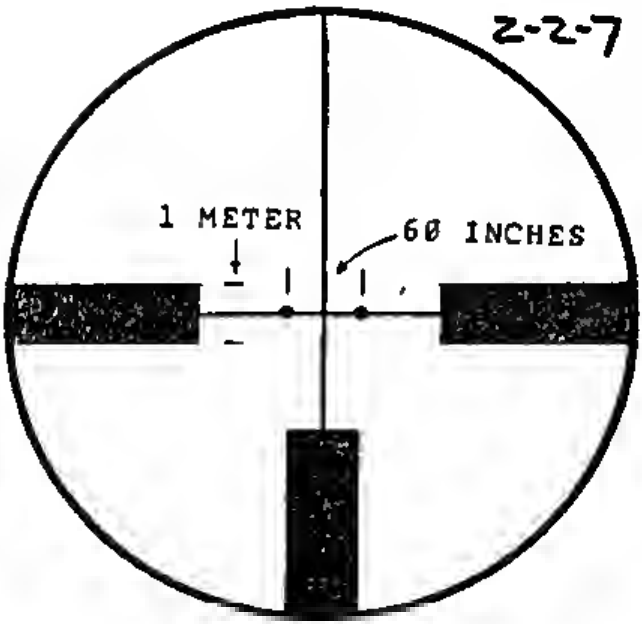
2-2-6



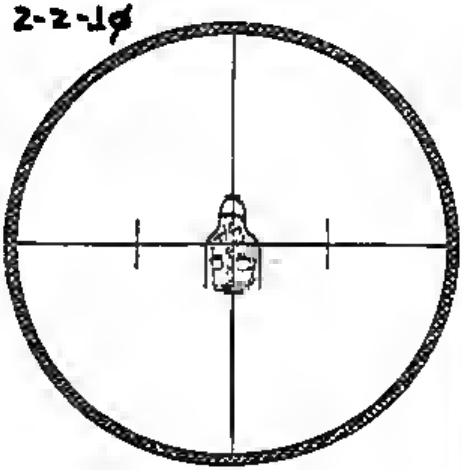
2-2-8



2-2-9

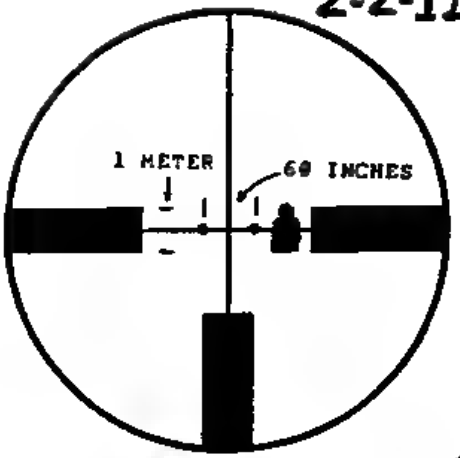


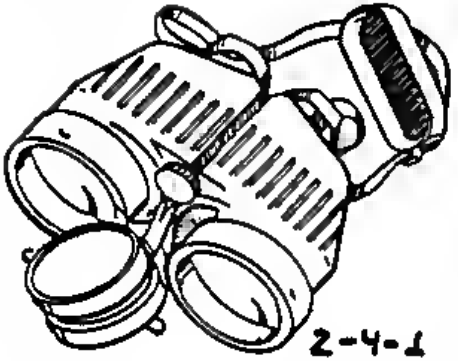
2-2-7



2-2-10

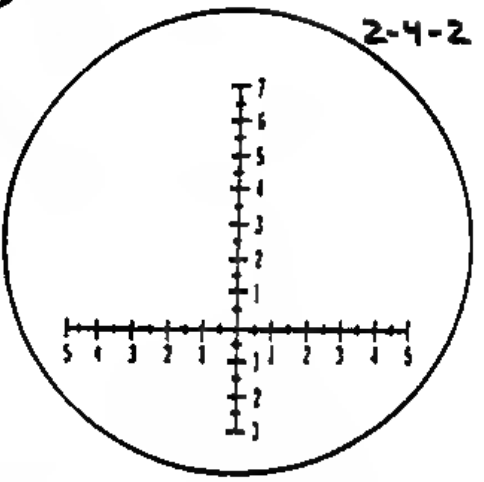
2-2-11

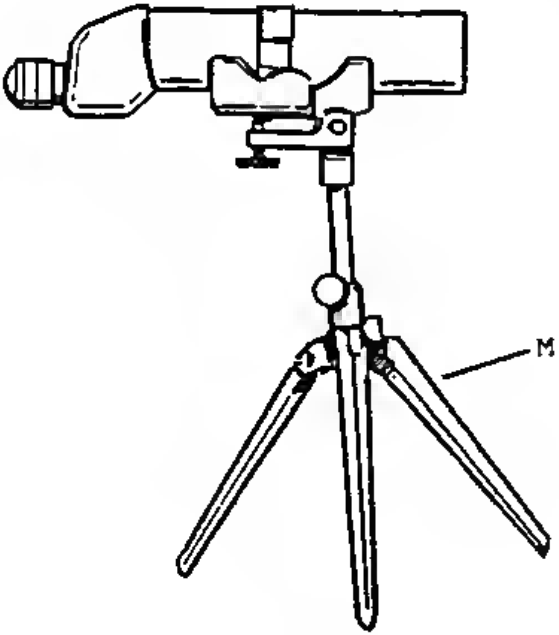




2-4-1

2-4-2





LENS COVER

REMOVABLE
EYEPIECE
COVER

M15 TRIPOD

2-4-3

2-5-1

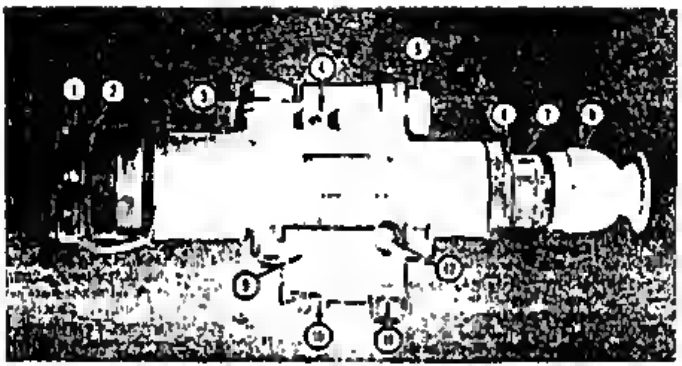
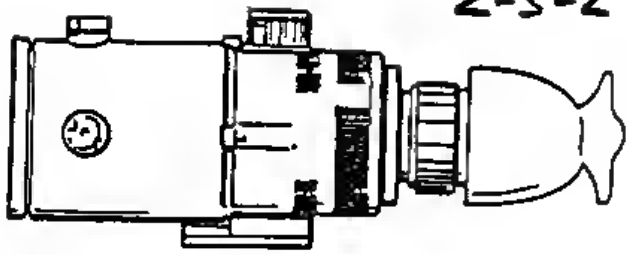
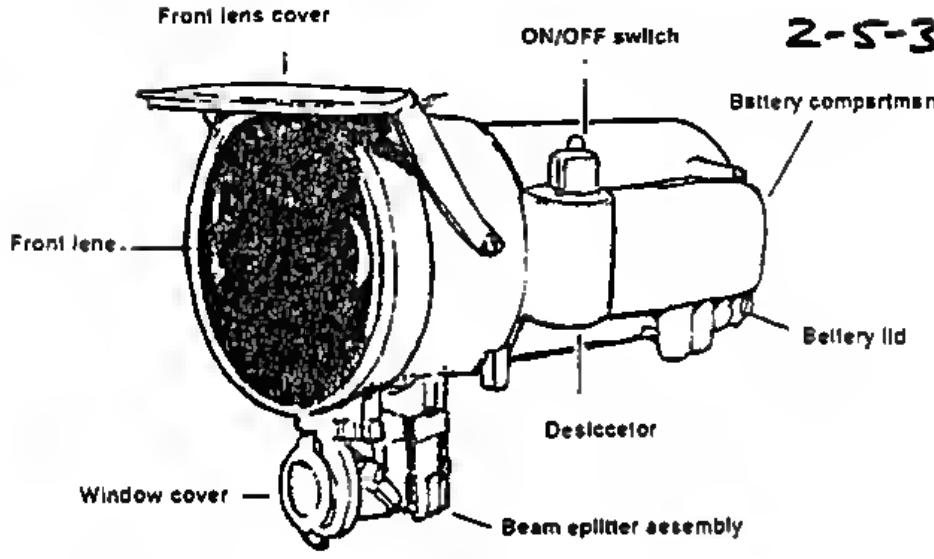


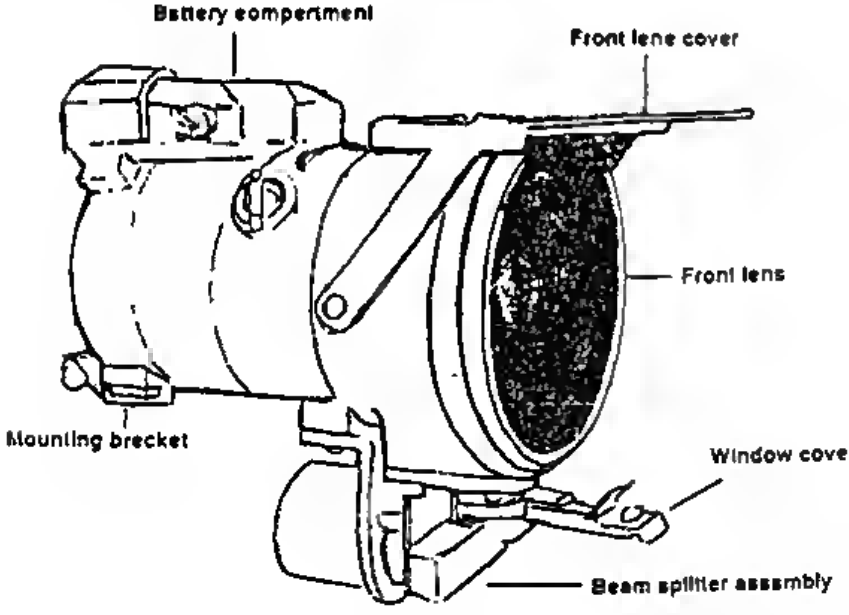
Figure 2-1. Night vision sight, individual served weapon, AN/PVS-4

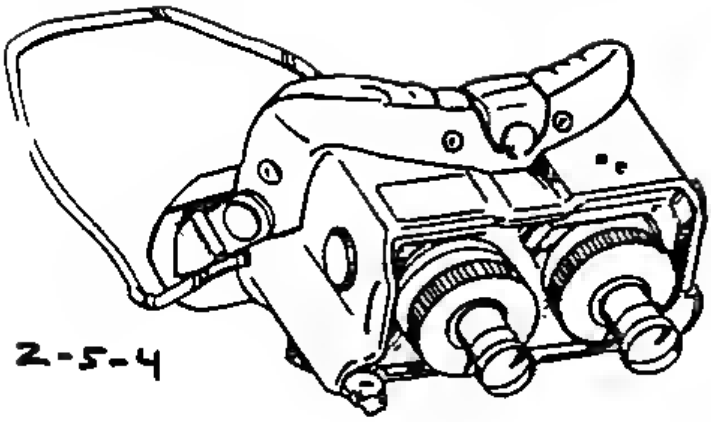
2-5-2



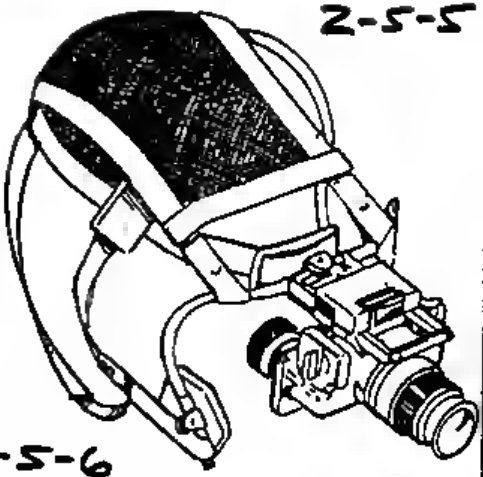
2-5-3


Front lens cover
ON/OFF switch
Battery compartment
Front lens
Battery lid
Desiccator
Window cover
Beam splitter assembly


Battery compartment
Front lens cover
Front lens
Mounting brecket
Window cover
Beam splitter assembly

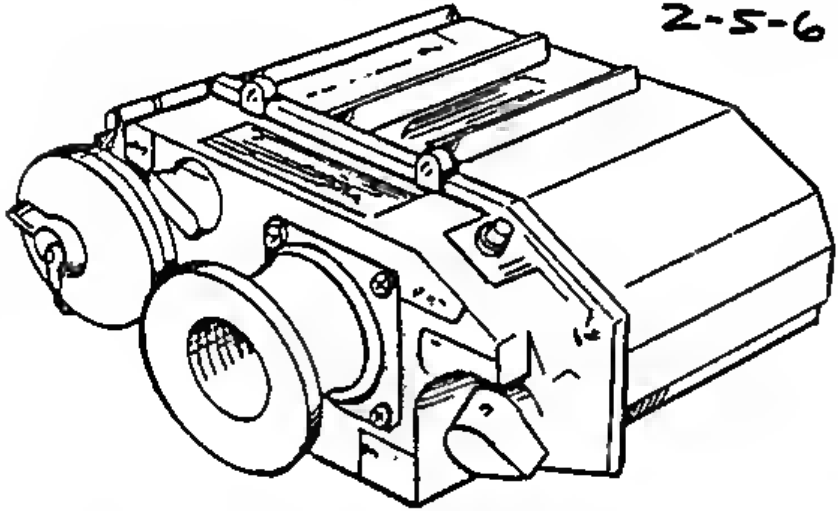


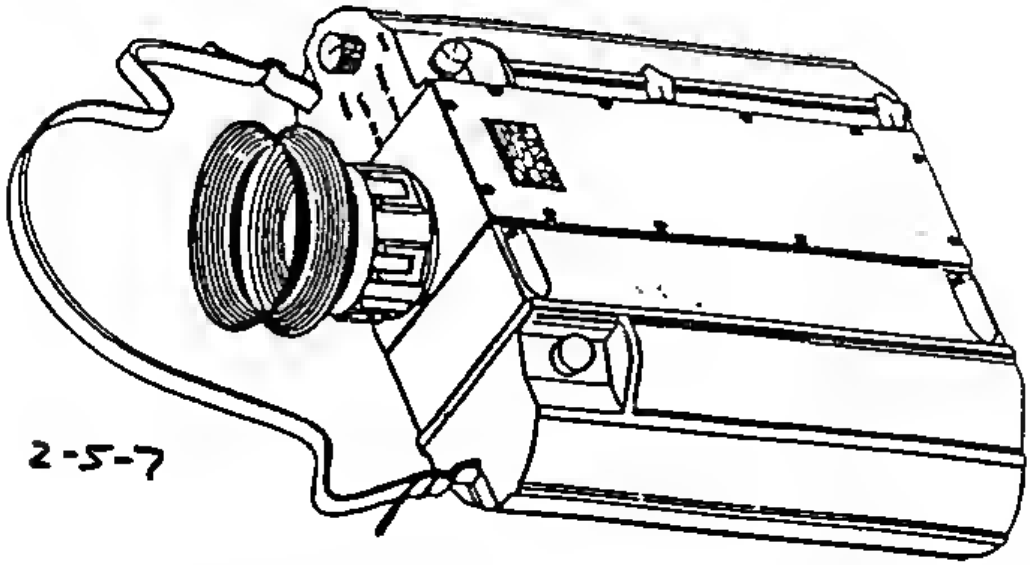
2-5-4



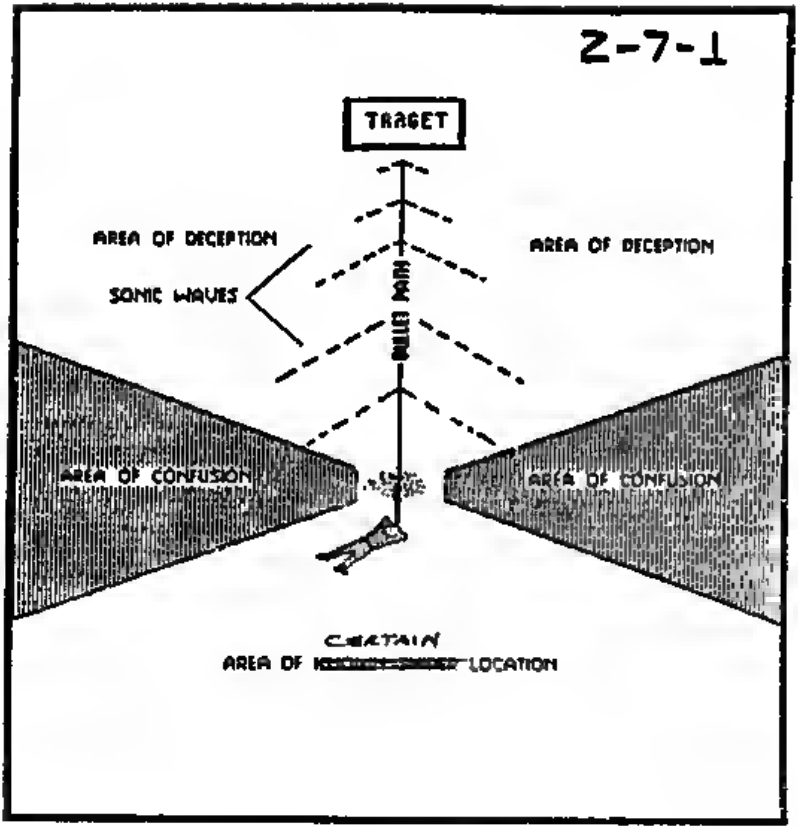
2-5-5

2-5-6

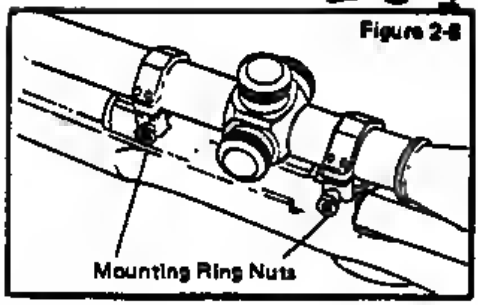


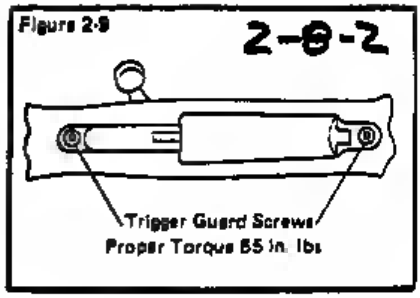


2-5-7

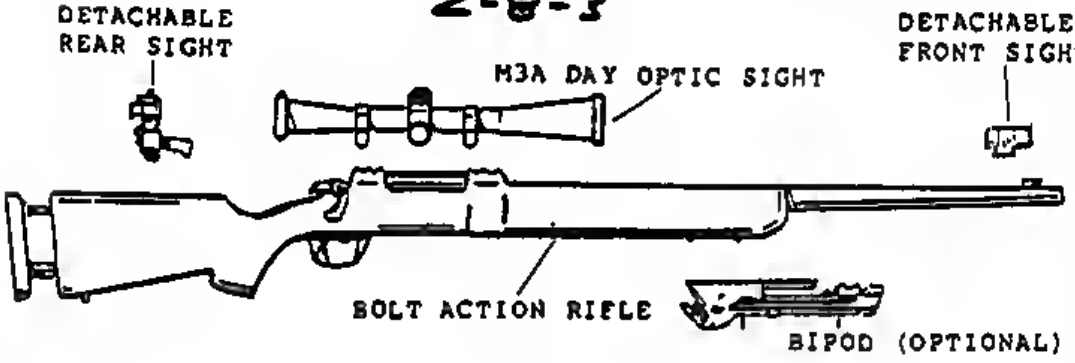

2-7-1
TARGET
AREA OF DECEPTION
AREA OF DECEPTION
SONIC WAVES
BULLET PATH
AREA OF CONFUSION
AREA OF CONFUSION
CERTAIN
AREA OF LOCATION

2-8-1

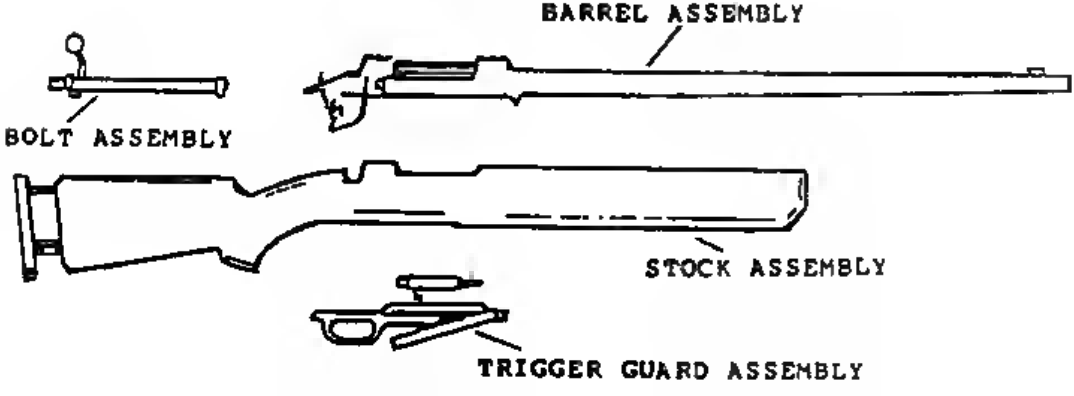




2-8-3



(a) MAJOR ASSEMBLIES



Chapter 3

MARKSMANSHIP TRAINING

3-1. OVERVIEW

The role of the Specisl Operations seiper ie to engage targets wıth precision rifle fire. The sniper's skill wıth a rıfle is the most vıtal skill in the srt of snipieg. Thıs skıll ie extremely perisheble. Sniper marksmanship differs from bseic rifle marksmanship only in the degree of expertisa. The sniper, using basic end edvenced marksmanship as building blocks, must sdapt the conventionsl methods of shonting to meet sniping's unique raquirements. The sniper is required to make first-round hits in s field environmeet ueder less thae ideal conditions. Sniper tachniques msy eeem to contradict commonly accepted marksmanship tachniquee, but the seiper must adapt if ha is to be successful. Snipers must become exparts in marksmanship. The fundamentsls ere davaloped into fixsd and correct shooting hsbits thst become instinctivs. This ıs tha: "Conditioning of the nervous systsm."

Standards of Performance

Snipsrs should msintsin thsir proficiency st the following minimum stsndsrds:

- 100 % hits on stationary tsrgsts st rsnges of lsss thsn 600 msters.
- 70 % hits on ststionsry tsrgsts st rsngss from 600 to 900 maters.
- 70 % hits on moving targsts st rsngss of lsss thsn 500 ɯetsrs.

3-2. SHOOTING POSITIONS

Sniper shooting positions are cherecterizad by one word: STABILITY. Unlike the tsrget shooter who must shoot from different positions of vsrying stsbility to sstisfy marksmanship rules, ths sniper sesrches for the most stable positioe possible. He ıs not trying to see if he csn hit tha tsrget--he must know he cen hit the target! A mıss could mesn a failed mıssion or hıs life. A good position enables the sniper to relax aed concentrste when prepsring to fire. Sniper shootieg positions must be solid, steble, and dursble.

The sniper seeks the most stable position possible. Whether prone, kneeling, or staeding, the sniper's position should be supported To achieve this, he should seek shooting reete or supports. Shooting from a rest helps to eliminste human fsctors such ss heertbeet, muscular tension, snd fstigue. A rest csn

support both the front and the rear of the rifle, as in the case of benchrest shooting.

Regardless of the rest selected (tree, dirt, sandbag, etc.), the sniper should prevent any objects from contacting the barrel. During the firing process, the barrel vibrates like a tuning fork, and any disturbence to this harmonic motion will result in an erratic shot. Additionally, a hard support will normally cause the rifle to change its point of impact. The sniper can help to eliminate this problem by shooting from objects of similar hardness. The sniper's hat, glove, or sock filled with sand or dirt can be placed between the rifle forestock and shooting support to add consistency from range to combat. A support or rest offers a tremendous advantage to the sniper and must be used whenever possible. Accuracy with a rifle is a product of consistency, and a rest offers consistency to shooting positions.

On the battlefield, the sniper must assume a steady firing position with maximum use of cover and concealment. Considering the variables of terrain, vegetation, and the tactical situation, the sniper can use many variations of the basic positions. When assuming a firing position, he must adhere to the following basic rules:

- The sniper's most frequently used and most stable position should be the prone position or its variations.
- Use any support available.
- Avoid touching the support with the barrel of the weapon since it interferes with the barrel harmonics and creates shot displacement.
- Use a cushion between the weapon and the support.
- Do not allow the side of the weapon to rest against the support. This will have an effect on the weapon during recoil, and may affect the point of impact.
- Never cant the weapon while firing or aiming. The sniper should tilt his head to the weapon, not the weapon to his head.

<u>The Three Elements of a Good Position</u>

The three elements of a good position are: bone support, muscular relaxation, and a natural point of aim on the aiming point.

- <u>Bone support</u>. Positions are designed as foundations for the rifle, and good foundations for the rifle are important to the sniper. When a sniper establishes a weak foundation (position) for the rifle, the position will not withstand the repeated recoil of the rifle in a string of rapid fire shots or deliver the support

necessary for precise shooting. Therefore, the shooter will not be able to apply the marksmanship fundamentals properly. Proper bone support is a learned process; only through practice (dry fire, live fire) will the sniper gain proficiency in this skill.

o Muscular relaxation. The sniper must learn to relax as much as possible in the various firing positions Undue muscle strain or tension causes trembling, which is transmitted to the rifle However, in all positions, a certain amount of controlled muscular tension is needed. For example, in a rapid-fire position there should be pressure on the spot weld. Only through practice and achieving a natural point of aim will the sniper learn muscular relaxation.

o Natural point of aim on the aiming point. In aiming, the rifle becomes an extension of the body, so it is necessary to adjust the body position until the rifle points naturally at the target. To avoid the use of muscles to aim at a target, the sniper must shift his entire firing position to move his natural point of aim to the desired point of impact. This is achieved by the following process:

o Assume a good steady position.

o Close both eyes and relax as if preparing to fire.

o Open both eyes to see where the weapon is pointing.

o Leave the non-firing elbow in place, and shift the legs, torso, and firing elbow left or right.

o Repeat the process until the weapon points naturally at the desired point of impact.

The sniper can change the elevation of a natural point of aim by leaving the elbows in place and sliding the body forward or rearward. This causes the muzzle of the weapon to drop or rise, respectively. Minor adjustments to the natural point of aim can be made by the right leg (right-handed shooter). The sniper moves the lower leg in the opposite direction that he wants the sight to go. Another consideration is to maintain a natural point of aim after the weapon has been fired; therefore, proper bolt operation becomes critical. The sniper must practice reloading while in the prone position without removing the butt of the weapon from the firing shoulder.

The two techniques for accomplishing this task are as follows:

o After firing, move the bolt slowly while canting the weapon to the right. Execution of this task causes the spent cartridge to fall next to the weapon rather than flying through the air.

o After firing, move the bolt to the rear with the thumb of the firing hand. Uaing the index and middle fingera, reach into the receiver and catch the apent certridge caae ea it is being ejected. Thia technique doea not require canting the weepon

NOTE: The sniper condncts bolt operation under a veil or equivaleot camouflege to improve concealment.

Factors Common to All Positions

Eatablishiog e mental checkliat of ateady poaition elements greatly enhancea the sniper'e ability to echieve e firat-ahot hit. Thia checkliat iocludea the five fectora inhereot to a good firing poaition:

- o Non-firing hand.
- o Placement of the rifle butt.
- o Firing hand.
- o Elbowa.
- o Stock weld.

o Non-firing hand. Uae the non-firing hand aa a aupport. The non-firing hand ahould eithar support tha forastock or the butt of ths weapon. Never grasp the forestock with the non-firing hand. Let the weapon reat in the non-firing hand. If tha sniper grasps ths weapon, the rscoil and muscle tremor will causs srratic shota. If the non-firing hand is used to support the butt, placs the hand next to the ohsat and rest the tip of the butt on it. Ball the hand into a fist to raias or loosen the fist to lower the weapon'a butt. A prafarrad method to do this ia to hold s aock full of aand in ths non-firing hend and plsce the weepon butt on ths sock. This reducea body contact with the weapon. To raise the butt, aqueeze tha aock. To lower it, looaen the grip on the aock.

o Placement of the rifle butt. Place the rifle butt firmly in the pocket of the ahoulder. Proper placement of the butt helps to ateady tha rifle end leaaen recoil. The key to the corract rifle butt method is conaistent rearward preaaure by the ahooting hand end correct placemeot in tha ahoulder. A hard hold veraua a very light hold may change bullet impact. Again, consistency is important. Insert a ped on the ghillie suit where contact with the butt ia meda to reduce the pulae beat and breathing effects, which can be trenamitted to the weepon.

o Firing hand. Greap the small of the stock firmly but not rigidly with the ahooting hand. Exert preaaure rearward, mainly with the middle aod ring fingera of the firing hend. Do not "choke" the amall of the etock. A choking-type grip can cauae a twisting action during recoil. In addition, do not steer the rifle

with the hand or shoulder. Make large windage adjustments by altering the natural point of aim, not by leaning or steering the rifle, as this will cause the rifle to steer in that direction during recoil. The thumb can be wrapped over the top of the small of the stock and used to grasp, or it can be laid alongside or on top of the stock in a relaxed manner. Place the index finger on the trigger, ensuring that it does not touch the stock of the weapon and will not disturb the lay of the rifle when the trigger is pulled. Maintain a steady rearward pressure on the weapon when shooting. This will help steady the weapon.

o Elbows. Find a comfortable position that provides the greatest support.

o Stock weld. The stock weld is the point of firm contact between the sniper's cheek and the stock. The cheek is placed on the stock in a position that gives proper eye relief. The stock weld will differ from position to position. However, due to the position of the telescope on the sniper rifle and the necessity to have eye relief, the sniper may not get a normal spot weld. The important consideration is to get firm contact so that the head and weapon recoil as one unit, thereby facilitating rapid recovery. The point on the weapon should be a natural point where eye relief can be maintained. Place the cheek in the same place on the stock with each shot. A change in stock weld tends to cause misalignment with the sights, thus creating misplaced shots. This is more of a problem when using iron sights, than with the telescopic sight that is properly adjusted to eliminate parallax.

Once a spot or stock weld is obtained, the same positioning should be used for each shot. Stay with the weapon, do not lift the head from the stock during recoil, and maintain the spot weld or cheek weld. During the initial period of firing, the cheek may become tender and sore. To prevent this and to prevent flinching, press the face firmly against the stock.

Sniper Shooting Positions

o Prone Supported Position

The sniper first selects his firing position. He picks a position that gives the best observation, fields of fire, and concealment. He then assumes a comfortable prone position and prepares a firing platform for his rifle (Figure 3-2-1). The rifle platform should be as low to the ground as possible. The rifle should rest on the platform in a balanced position to the rear of the upper sling swivel and forward of the magazine. Care must be taken to ensure that the operating parts, the magazine, and the barrel do not touch the support, as contact will cause erratic shots. The sniper then forms a wide, low bipod with his elbows. He grips the small of the stock with his firing hand, thumb over or alongside the small of the stock and the forefinger (just in front of the first joint) on the trigger, and pulls the butt of the rifle

into his firing shoulder. He then places the non-firing hand under the toe of the stock, palm down, and places the lower sling swivel into the web of the thumb and forefinger. The fingers and thumb of the non-firing hand can be adjusted by curling the fingers and thumb into a fist or relaxing the fingers and thumb and laying them flat. In this manner the sniper can raise or lower the barrel onto the target. As an alternative, a sock filled with sand or dirt can be placed under the toe of the stock. The sniper then grips the sock with the non-firing hand and by squeezing the sock or relaxing pressure on it, he can lower or raise the barrel onto the target. This method is extremely stable and accurate. However, the sniper must ensure that the sock is filled only to the size of a softball as a minimum or a large grapefruit as a maximum. He then relaxes into a comfortable supported position, removing his non-firing hand from the stock when necessary to manipulate the scope. He can change magazines with either hand, or he can reload single rounds into the M24 with the firing hand while supporting the rifle at the toe of the stock with the non-firing hand. When firing from this position, the sniper must have a clear field of fire. This is extremely important because the shot may become erratic if the bullet strikes a leaf, grass, or twig.

o <u>Hawkins Position</u>

The Hawkins position is used when a low silhouette is desired. This position is very useful when firing from a small depression, a slight rise in the ground, or from a roof (Figure 3-2-2). This is the steadiest of all shooting positions. Concealment is also greatly aided by the Hawkins position because the firer is lying flat on the ground. This position cannot be used on level ground since the muzzle cannot be raised high enough to aim at the target.

The Hawkins position is similar to the prone supported position, except that the support of the weapon is provided by the non-firing hand. Grasp the front sling swival with the non-firing hand, forming a fist to support the front of the weapon. Make sure that the wrist and elbow are locked straight; the recoil is taken up entirely by the non-shooting arm. Otherwise, the face will absorb the weapon's recoil. Lie flat on the ground, either directly behind the rifle (Canadian version) or angled off to one side (British version). Place the rear or toe of the stock under the armpit, resting the stock on the ground if possible. It will appear as though the sniper is lying on the rifle. Make minor adjustments in muzzle elevation by tightening or relaxing the fist of the non-firing hand. If more elevation is required, place a support under the non-firing fist.

If using the Canadian version, place the butt of the rifle in the shoulder. If using the British version, tuck the butt under the armpit. The sniper should always use what is the most comfortable.

- Prone Unsupported Position

The prone unaupported poaition is nnly usad when a auitable support is not availeble, but the prone position is rsquired for stability and concealment (Figure 3-2-3). The sniper facea tha target squarely with the aling attsched to the non-shooting arm above the bicep and liea down fscing the target, legs atraight to tha reer. The non-ahooting elbow is extended so thst it is in lins with body and the target and as far under the rifle as comfortsble. Witb the ahonting hand, puah forward on the butt of the stock end fit it into the pocket nf ths shoulder. Place the shooting aide albow down wherever it feels natural and graap the grip of the stock, pulling it firmly into the ahouldsr. The sniper lets hia chask reat naturally on the atock where he can aee through tha sights snd acquire the target. He draws hia shooting side knee up to a comfortable poaitinn sn ea to take the weight off of the diaphragm. A natural point of eim is obtained by adjuating the slavetion by aliding the body forward or rearward end adjusting the brasthing.

- Prone Backward Shooting Position

Tha prone backwsrd ahooting poaition ia uaad when the terrain or aituation dictates (Figure 3-2-4). Thia poaition providea e higher angle of fire ea required when ahooting uphill and other poaitiona are inedequate. Alao, the aniper would uaa thia poaition whan he must engage e target to hia rear but cannot turn around becauae of the enemy aituetion or hide conatrictiona. The aniper aaaumea e comforteble position on hia aide with both lega bent for aupport end atability. The aniper placea the butt of the SWS into the pocket of hia ahoulder where it meeta tha armpit. He attempts to aupport hia head for better atability and comfort. The amall exit pupil of the teleacope requirea the aniper to maintein a aolid hold end center the exit pupil in the field of the taleacope to minimize tha errora in aight elignment.

- Sitting Supported Position

To assume thia poaition, prepare e firing platform for tha rifle or reat the rifle on the reisad portion of the poaition (Figure 3-2-5). Ensure that the barral or operating parts do not touch the support. Aasume e comfortable aitting poaition to the rsar of the rifle, grasp tha small nf the stock with the firing hand, and place tha butt of the rifle into the ahoulder pocket. Plece the non-firing hand on tha small nf the stock to assiat in getting e atock wsld and the proper eya relief.
Rast the albows on the inaide nf the kneea in a msnner similar to the atandsrd crosaed-leg position. Adjuat the poaition by vsrying the position of the albows nn the inside of the knees or by varying the body position. This poaitinn may be tiring; therefore, the firing mission ahould be alternated fraquentiy between the sniper tasm membera.

- Sitting Unsupported Positinn

The sniper faces his body 30 degrees away from the target in the direction of the shooting hand. He sits down and crosses his ankles so that the non-shooting side ankle is across the shooting side ankle (Figure 3-2-6). The sling is properly adjusted for the sitting position. The shooting hand palm places the butt of the stock into the shoulder while allowing the weapon to rest on the non-shooting hand. The shooting hand pulls the stock firmly into the shoulder. The elbows rest inside the knees and the body is leaned forward. Direct contact between the points of the elbows and the points of the knees is not permitted, so that the bones and not the muscles support the weapon. The stock is held high enough in the shoulder to require only a slight tilt of the head to acquire the sights, without canting the weapon. The muzzle is lowered and raised by moving the non-shooting hand forward and backward on the forestock. The breath is held when the sights are on the target.

The cross-leg position is assumed in the same way as the sitting position, but the sniper faces 45 to 60 degrees away from the target and crosses his legs instead of his ankles.

o Kneeling Supported Position

The supported kneeling position is used when it is necessary to quickly assume a position and there is insufficient time to assume the prone position (Figure 3-2-7). It can also be used on level ground or on ground that slopes upward where fields of fire or observation preclude using the prone position.

This position is assumed in much the same manner as the standard kneeling position, except that a tree or some other immovable object is used for support, cover, or concealment. Support is acquired by contact with the calf and knee of the leading leg, the upper forearm, or the shoulder or possibly by resting the rifle on the hand lightly against the support. As with other supported positions, the sniper ensures that the operating parts and the barrel do not touch the support. Since the area of support provided is greatly reduced, bone support is maximized.

The position is assumed in the following manner (right-handed firers use these techniques; left-handed firers do the opposite). The sniper faces the direction of the target, 45 degrees to the right. He kneels down and places the right knee on the ground. Keeping the left leg as vertical as possible, he sits back on the right heel, placing it as directly under the spinal column as possible. A variation is to turn the toe inward and sit squarely on the right foot. The small of the stock is grasped with firing hand, and the fore-end of the weapon is cradled in a crook formed with the left arm. The butt of the weapon is placed in the pocket of the shoulder, then the meaty underside of the left elbow is placed on top of the left knee. Reaching under the weapon with the left hand the sniper lightly grasps the firing arm. He relaxes forward and into the support, using the left shoulder as a contact

point. This reduces transmission of the pulse beat into the sight picture. A tree, building, or vehicle can be used for support.

- Sling Supported Kneeling Position

If vegetation height presents a problem, the kneeling position can be raised by using the rifle sling (Figure 3-2-8). This position is assumed executing the first three steps for assuming a kneeling supported position. With the leather sling mounted to the weapon, the sling is turned one-quarter turn to the left. The lower part of the sling will then form a loop. The left arm is placed through the loop; the sling is pulled up the arm and placed on the upper arm above the bicep. The sling is tightened on the arm by manipulating the upper and lower parts of the sling, if time permits. The arm is rotated in a clockwise motion around the sling and under the rifle with the sling secured to the upper arm. The fore-end of the stock is placed in the "V" formed by the thumb and forefinger of the left hand. Relax the left arm, and let the sling support the weight of the weapon. The flat part of the rifle is placed behind the point of the left elbow on top of the left knee. The left hand pulls back along the fore-end of the rifle toward the trigger guard to add to stability.

- Squatting Position

The squatting position is used during hasty engagements or when other more stable positions would be unacceptable due to inadequate height or concealment (Figure 3-2-9). The sniper assumes this position by facing 45 degrees away from his direction of fire, feet shoulder-width apart, and simply squats. The sniper can either rest his elbows on his knees or wrap them over his knees. Body configuration will determine the most comfortable and stable technique to use. Solid supports can also be used for the sniper to lean up against, or to lean back into.

- Standing Supported Position

The supported standing position is used under the same circumstances as the supported kneeling position, where time, field of fire, or observation preclude the use of other, more stable positions. It is the least steady of the supported positions and should be used only as a last resort (Figure 3-2-10).

This position is assumed in much the same manner as the standard standing position, except that a tree or some other immovable object is used for support. Support is acquired by contact with the leg, body, or arm or by resting the rifle lightly against the support. The sniper ensures that the support makes no contact with operating parts or the barrel of the rifle.

To assume this position with horizontal support, such as a wall or ledge, proceed as follows. The sniper locates a solid object for support. Branches are avoided as they tend to sway when the wind is present. The fore-end of the weapon is placed on top of the support; the butt of the weapon is then placed into the

pocket of the shouldar. A "V" is formed with the thumb snd forefinger of the non-firing hand. Place the nonfiring hend, pslm facing away, against the support with the fore-end of the weepon reating in the V of the hand. Thia steadies the weapon end ellows quick recovery from recoil.

A verticsl aupport auch as a tree, talephone pole, corner of building, or vehicla, may be used (Figure 3-2-10A). Locate the stsble support. Then face 45 dagrees to right of target, snd place the pslm of the non-firing hand at arm's length agsinst the support. Lock ths arm strsight, lat the lasd leg buckla, and place body waight againat tha non-firing hand. Keap tha trail leg straight. Place the fore-and of the weapon in tha V formad by extending the thumb of the non-firing hand. Exert more preasure to the resr with the firing bend.

o Standing Unaupported or Off-hand Poaition

This poaition is tha least desirable becauae it is the lesat etsbls and most exposad of all the positions (Figurs 3-2-11). The situation may dictata that this position must be ussd. Ths sniper facas parpandicular to the target, facing in the direction of his shooting hand, with his lags spraad about shoulder width apart. He greepe the pietol grip of tha stock with his shooting hand snd supporte the fore-end with the noo-shooting hsnd. Hs rsises the etock of the weapon eo thet the toe of tha stook fits into ths pockst of tha shouldar and tha weapon ie lying on its eide awsy from tha body. Tha waapon is rotated until tha weapon ie verticsi and tha ehooting eibow ie pareiiei with tha ground. Ths non-ehooting eibow ie pulled into the eide to eupport tha weapon with ths erm end rib csgs. Ths sniper tilte hie heed elightiy towsrd ths weapon to obtain a natural spot or ohask weld and to align hie aya with tha sights. If his eye is not alignad with the eights, hs adjusts his haad position until tha front sight end the target csn be aaan through tha rear aight. Once in position hs looks through hie sights end moves his entire body to gat tha aighta on target. Ha does not muscle tha weapon onto the target. Ths sniper raats tha rifla on a aupport to ralax hia arm muaclas sfter firing the shot and following through.

o Other Supported Positions

During training in fundamentala, positions are taught in a atap-by-step process. The sniper is guided through a aeriaa of praciaa movements until he obtains the correct poaition. Tha purpoae of this ia to anaura that ha knows and correctly appliaa all of the factora that can aaaiat him in holding the rifle stesdy. As the sniper perfects the standard and aupportad positions, he can then uae his ingenuity to devise other supportad poaitions. Through practica he will gradually become accustomed to the faal of these positions and will know inatinctivaly when his position ia correct. This is psrticularly important in combat, as the sniper must be able to assume positiona rapidly and be prepsred to anhance the stability of the position by adapting it to eny avsilsble

artificial support. Significant nonstandard supported positions are as follows:

* Foxhole Supported Position

This position is used primarily in prepared defensive areas where there is time for preparation. In this type of position, the sling may be used for added support or sandbags or other material to provide a stable firing platform.

* Tree Supported Position

This position is used when observation and firing into an area cannot be accomplished from the ground. The important consideration when using this position is to select a tree that is inconspicuous, one that is strong enough to support the sniper's weight, and one that affords concealment. The sniper must remember that he limits his avenues of escape when in a tree.

* Bench Rest Position

This position can be used when firing from a building, a cave, or a deeply shaded area. The sniper can use a built-up platform or table, with a sitting aid, and a rifle platform for stability. This is a stable position and one that will not tire the sniper. When using this position, the sniper should stay deep in the shadows to prevent detection by the enemy.

Field-Expedient Weapon Support

Support of the weapon is critical to the sniper's success in engaging targets. Unlike a well-equipped firing range with sandbags for weapon support, the sniper will encounter situations where weapon support relies on common sense and imagination. The following items are commonly used as field-expedient weapon supports:

o Sand Sock. The sniper needs the sand sock when delivering precision fire at long ranges. He uses a standard-issued, olive-drab wool sock filled one-half to three-quarters full of sand and knotted off (Figure 3-2-12). He places it under the rear sling swivel when in the prone supported position for added stability. By limiting minor movements and reducing pulse beat, the sniper can concentrate on trigger control and aiming. He uses the non-firing hand to grip the sand sock, rather than the rear sling swivel. The sniper makes minor changes in muzzle elevation by squeezing or relaxing his grip on the sock. He also uses the sand sock as padding between the weapon and a rigid support.

o Rucksack. If the sniper is in terrain bare of any natural support, he may use his rucksack (Figure 3-2-13). He must consider the height and presence of rigid objects within the rucksack. The rucksack must conform to weapon contours to add stability.

o Sandbag. The sniper can fill and empty a sandbag on site (Figure 3-2-14).

o Tripod. The sniper can build a field-expedient tripod by tying together three 12-inch long sticks (one thicker than the others) with 550 cord or the equivalent (Figure 3-2-15). When tying the sticks, he wraps the cord at the center point and leaves enough slack to fold the legs out into a triangular base. Then, he places the fore-end of the weapon between the three uprights. A small camera table tripod padded with a sock full of sand or dirt can also be used.

o Bipod. The sniper can build a field-expedient bipod by tying together two 12-inch sticks, thick enough to support the weight of the weapon (Figure 3-2-16). Using 550 cord or the equivalent, he ties the sticks at the center point, leaving enough slack to fold them out in a scissor-like manner. He then places the weapon between the two uprights. The bipod is not as stable as other field-expedient items, and it should be used only in the absence of other techniques.

o Forked Stake. The tactical situation determines the use of the forked stake (Figure 3-2-17). Unless the sniper can drive a forked stake into the ground, this is the least desirable of the techniques; that is, he must use his non-firing hand to hold the stake in an upright position. Delivering long-range precision fire is a near-impossibility due to the unsteadiness of the position. The sniper should practice using these supports at every opportunity and select the one that best suits his needs. He must train as if in combat to avoid confusion and self-doubt.

Slings

The M1907 National Match leather sling is superior to the standard web sling when used as a shooting aid. Snipers who use a sling when shooting should be aware of the possibility of a zero change. If the weapon is zeroed using a sling support, the point of impact may change when/if the sling is removed. This is most noticeable in rifles with stocks that contact the barrel, such as the M21. The sling must be adjusted for each position. Each position will have a different point in which the sling is at the correct tightness. The sniper counts the number of holes in the sling and writes these down so that he can properly adjust the sling from position to position.

3-3. TEAM FIRING TECHNIQUES

A successful sniper team consists of two intelligent and highly versatile members: the sniper and the observer. Each must be able to move and survive in a combat environment. The sniper's special mission is to deliver precision fire on targets that may

rule out the use of cooventionsl-aizs fightiog forces. They muat also:

- Calculate the rsnge to the target
- Determine the effects of weather on ballistics
- Make nsceaaary aight changes
- Obssrve bullet impact
- Quickly critique performaoce before any subsequent shota

This calls for s coordinated, efficieot team effort.

Sniper and Obsarver Responsibilities

Each member of the soiper taam has apecific responsibilitiea when sngaged in sliminatiog s targst. Only through rspeated practice can tha tsam begin to functioo properly. Rsaponsibilitias of taam membars ara sa follows:

The anipar:

- Builda a ataady, comfortabla position
- Looatss and idantifias the dsaignsted tsrgat
- Eatimatas tha raogs to ths target
- Corractly disla in proper alavation snd wiodaga to angaga the tsrgat
- Notifiaa obsarver of raadioass to fire
- Takss aim at the designated targat
- Controla braathing st natural reapirstory psuae
- Executes proper trigger control
- Follows through
- Makes an accurata aod timely ahot call
- Prepsrea to fire aubsequsnt shots, if necessary

Ths obasrver:

- Properly positiona himself.
- Selects ao appropriate target. The targst closest to the taam praaents the greatsat threat. If multipla targets are visible

at various ranges, the engagement of closer targets allows the sniper to confirm his zero and ensure his equipment is functioning properly. The observer must consider existing weather conditions before trying a shot at a distant target (effects of weather increase with range).

o Assists in range estimation.

o Calculates the effect of existing weather conditions on ballistics. Weather conditions include detecting elements of weather (wind, light, temperature, humidity) that will affect bullet impact, and calculating the sight adjustments to ensure a first-round hit.

o Reports sight adjustment data to sniper.

o Uses the M49 spotting telescope for shot observation. He aims and adjusts the telescope so that both the downrange indicators and the target are visible.

o Critiques performance. He asks the sniper for a shot call and compares sight adjustment data with bullet impact if the target is hit. He gives the sniper an adjustment and selects a new target if changes are needed. If the target is missed, the observer follows the above procedure and questions the sniper about his performance and shot call so that subsequent sight adjustments ensure a target hit.

<u>Sniper and Observer Positioning</u>

The sniper should find a place on the ground that allows him to build a steady, comfortable position with the best cover, concealment, and visibility of the target area. Once established, the observer should position himself out of the sniper's field of view on his firing side.

The closer the observer gets his spotting telescope to the sniper's line of bore, the easier it is to follow the trace (path) of the bullet and observe impact. A position at 4 to 5 o'clock (7 to 8 o'clock for left-handed firers) off the firing shoulder and close to (but not touching) the sniper is best (Figure 3-3-1).

If the sniper is without weapon support in his position, he must use the observer's body as a support. This support is not recommended since the sniper must contend with his own movement and the observer's body movement. The sniper should practice and prepare to use an observer-supported position, if needed. A variety of positions can be used; however, the two most stable are when the observer is in a prone or sitting position.

o <u>Prone</u>. To assume the prone position, the observer lies at a 45- to 75-degree angle to the target and observes the area through his spotting telescope. The sniper assumes a prone -

supported position, uaing the back of the observer's thigh for support (Figure 3-3-2). Due to the offaet angle, the obaerver may only see the bullet impact.

o Sitting. If vegetation height prevents the aniper from assuming a prone poaition, the aniper hsa the obaerver face tha targat area and aaaume a cross-legged aitting poaitioo. The obaerver places his elbows on his knaea to atabilizs hia position. For obsarvation, the obaerver uaea binoculara held in his hands. The spotting teleacope is not recommended due to its higher magoificatioo and the unsteadinaaa of thia position. The aniper places tha fore-eod of the weapon acrosa the obaerver'a trapezius muscle on his non-firing aide (Figure 3-3-3), stabilizing tha weapon with ths forefinger of the non-firing haod (Figure 3-3-4). The aniper is behind the observer in an open-leggad, cross-laggad, or knaeling poaition, depending on ths target's alevatioo (Figure 3-3-5). Whao uaing thaaa positiona, thc aniper'a affactivc engagement of targeta at extended ranges is difficult aod used only as a last reaort. Whan practicing thaaa poaitions, tha sniper and obsarvar must antar raspiratory peuae togather to eliminata breathing movamant.

3-4. SIGHTING AND AIMING

Tha soiper's usa of iron sights sarves mainly as a back-up system to his optical sight. Howevar, iron sights are an excellant meens of training for the sniper. Tbe sniper is expactad to be proficiant in tha use of iroo sights before he obtains formal sniper training, and ha must remaio proficiaot. By utilizing iron sights duriog traioiog, tha sniper is foroed to maintain his cooocantratioo on tha fundamentals of shooting. For a raview of baaic rifle marksmanship, reference should be made to FM 23-8 (M14 and M14A1 Rifle and Rifle Marksmanship), FM 23-9 (M16A1 and M16A2 Rifle Marksmanship). While these manuals are good for a basic reviaw, some modifications io shooting techniques may be made.

Tha snipar bagina the aiming proceaa by aligniog the rifle with the targat wheo aasuming a firing position. He should poiot the rifle naturally at the dasired point of aim. If hia musclaa are used to adjuat the weapon onto the point of aim, they will automatically relax as the rifle fires, and the rifle will bagin to move towarda its natural point of aim. Becauae this movament begios just befora the weapon diacharges, the rifle ia moviog aa the bullst leavaa the muzzle. Thia cauaea diaplaced ahota with no apparent cauae (racoil disguiaaa the movement). By adjuating the weapon and body aa a aingle unit, rechecking, and readjusting as oaedad, the aniper achievaa a true natural point of aim. Once the poaition ia established, the sniper then aims the wsspon at the axact point on the target. Aiming involves three factors: eye relief, sight aligomsnt, and sight picture.

Eye Relief

Thia ia the distance from the eniper's firing eye to the rear sight or the rear of the taleacope tube. Whan uaing iron aighta, the aniper ensurea that thia diatance remaina conatant from ahot to ahot to pracluda changing what he viewa through the rear aight. Howavar, raliaf will vary from firing poaition to firing poaition and from aniper to anipar, according to the aniper's neck length, hia angle of haad approach to tha atock, the depth of hia ahoulder pockat, and hia firing poaition. Thia diatance (Figure 3-4-1) is more rigidly controllad with taleacopic aighta than with iron aighta. Tha aniper muat take care to prevent eye injury cauaed by the teleacope tube atriking hia eyebrow during recoil. Regardleaa of the aighting ayatem he uaaa, ha muat placa hia haad aa upright aa poaaibla with hia firing eye located diractly behind tha raar portion of the aighting ayatem. Thia head placament alao allowa the muaclaa aurrounding hia aya to relax. Incorract head placament cauaaa the anipar to lcok out of the top or corner of hia eye, raaulting in muacular atrain. Such atrain leada to blurred viaion and can alao cauaa eye atrain. The aniper can avoid ayo atrain by not staring through the iron or teleacopic eighta for extended periods. The baat aid to conaietent eye relief ia maintaining tha aama atock weld from ehot to ahot. The reaaon for thia ia that aa the eye relief changaa, a change in eight alignmant will occur. Normal eye relief for tha rear aperture aize on the M21 and M24 ia 2 3/4 to 3 1/2 inchaa. Maintaining aya relief is a function of tha poaition and uaaa aithar apot weld or etock wald. Once the ahooter ia ready to fire, it ia imperative that ha concantrate on the front aight and not the target.

Sight Alignment

With iron aighta, eight alignment ia tha relationahip hatween the front and raar aights ea eeen by tha enipar (Figure 3-4-2). The eniper centers tha top edge of tha front eight blade horizontaliy and verticaiiy within the rear apertura. (Tha cantar of apartura ia aaaiaat for the eye to locate and allowa tha enipar to ha conaiatant in blade locetion.) With teleacopic eighta, eight alignment ia the relationahip hatween the croaa haira (reticle) and a full field of view aa aeen by the eniper. Tha aniper muat place hia haad ao that a full fiald of view fiila the tuba, with no dark ahadows or craacanta to canae miaplaced ahots. He centara tha reticle in a full field of viem, enauring the vertical croaa hair ia atraight up and down ao that the rifie ia not canted. Again, the centar ia eaaiaat for the aniper to locate, and allowa for conaiatent reticle piacement. Sight eiignment ia the moat critical factor in aiming. An arror in eight alignment increaaea proportionately with ranga and will result in incraaaed miaaea.

While centering the front aight worka well, other techniquaa alao work well and the aniper ehould try each to find which wnrka beat for him. The front aight of the M21 haa a aight block and a hex-haad acrew. By uaing the hex-haad ecrew aa a reference point, the ahooter can place the acrew et the bottom of the raar aperture.

By having two round rafarence points, the eye and the mind work togathar automaticsily to centsr the hex st the eama point. Another technique the ehooter may uea ie to divida the hex-head ecrew in helf snd centar it on the bottom of tha raar aperture. Still another techniqua is to centar the sight block on ths bottom of tha rear apsrtura. Any of these tschniquas work wall. It mattare only that the shooter ie comfortabla with tha tachniqua. Tha M24 hee e hooded front eight, which eimplifies sight alignment. Tha front eight hood ie cantered in the raar sight aperture.

Sight Picture

With iron eights, the sight picture ie the relationehip between the front sight blade, the resr aparture, snd tha tsrget ss seen by tha eniper (Figura 3-4-3). Tha eniper cantars the top sdgs of the blada in the reer aperture. He then placee the top edgs of the blads in the csnter of the lsrget visible maee of the target (disregard the head and uea the centar of tha torso). With telescopic eights, sight picture ie tha relationehip between the reticle and full field of visw and the target as seen by the eniper (Figure 3-4-4). Ths sniper centers the reticle in s full field of visw. Hs then plscss the reticle center on the largaet viaible mass of ths targst (sa in iron sights). Ths center of maaa of ths tsrgst ia sasisst for ths sniper to locsts, and it surrounds ths intended point of impact with a maximum amount of targst arsa. Whsn aiming, the snipsr concsntrstsa on ths front aight, not ths targat. Thia is oritical to dstect any srrors in sight alignmant, whioh ia mors importsnt than the sight picturs.

Whsn aiming, ths sniper hes aeveral choicsa of whers to hold ths front sight:

- Ths centsr hold. Tha centsr hold placaa ths front aight on the dssirsd point of impact. The problem with this ia that ths front aight blocka psrt of the target. Thie ie probably tha bast sight pioturs for combat use hecause it is the most "netural" for US Army-trained soldiers.

- Ths six o'olock hold. This hold placas the tergst on top of the front sight. The main problem ie that it ie eesy for the front sight to "pueh up" into the target, csusing tha round to go high.

- The line of whita hold. The lins of white sllows a strip of contraeting color to show hetween tha target snd the front sight. This permits tha shooter to eae the entire tsrget and prsvents the front sight from going high or low without the shooter noticing it.

Sight Alignment Error

When eight slignment snd sight picture sre perfect (regerdless of sighting system) snd sll else is done correctly, tha ehot will hit canter of maes on the target. However, with sn arror in sight

alignment, the bullet is displaced in the direction of the error. Such an error creates an angular displacement between the line of sight and the line of bore. This displacement increases as range increases; the amount of bullet displacement depends on the size of alignment error. Close targets show little or no visible error. Distant targets can show great displacement or can be missed altogether due to severe sight misalignment. An inexperienced marksman is prone to this kind of error, since he is unsure of what correctly aligned sights look like (especially telescopic sights). When a sniper varies his head position (and eye relief) from shot to shot, he is apt to make sight alignment errors while firing (Figure 3-4-5).

Sight Picture Error

An error in sight picture is an error in the placement of the aiming point. This causes no displacement between the line of sight and the line of bore. The weapon is simply pointed at the wrong spot on the target. Because no displacement exists as range increases, close and far targets are hit or missed depending on where the front sight or the reticle is when the rifle fires (Figure 3-4-6). All snipers face this kind of error every time they shoot. Regardless of firing position stability, the weapon will always be moving. A supported rifle moves much less than an unsupported one, but both still move in what is known as a wobble area. The sniper must adjust his firing position so that his wobble area is as small as possible and centered on the target. With proper adjustments, the sniper should be able to fire the shot while the front sight blade or reticle is on the target at, or very near, the desired aiming point. How far the blade or reticle is from this point when the weapon fires is the amount of sight picture error all snipers face. Also, the sniper should not attempt to aim for more than five or six seconds without blinking. This will be an additional strain on the eye and will "burn" the sight alignment and sight picture into the retina. This will cause minor changes in sight alignment and sight picture to go unnoticed.

Dominant Eye

Some individuals may have difficulty aiming because of interferences from their dominant eye, if this is not the eye used in the aiming process. This may require the sniper to fire from the other side of the weapon (right-handed firer will fire left-handed). To determine which eye is dominant, hold an index finger 6 to 8 inches in front of your eyes. Close one eye at a time while looking at the finger; one eye will make the finger appear to move and the other will not. The eye that does not make the finger appear to move is the dominant eye. If the sniper does not have a cross-dominant problem, it is best to aim with both eyes open. This allows him to see naturally and helps him relax. Also, with both eyes open, the sniper can find targets more quickly in his telescopic sight. Closing one eye puts an unnatural strain on the aiming eye and limits the sniper's protective peripheral vision.

Advantages of Telescopic Sights

Telescopic sights offer many advantages. They are:

o Extremely accurate aiming, which enables the sniper to fire at distant, barely perceptible, and camouflaged targets that are not visible to the naked eye.

o Rapid aiming, because the sniper's eye sees the cross hairs and the target with equal clarity in the same focal plane.

o Accurate fire under conditions of unfavorable illumination (such as at dawn and dusk) and during periods of limited visibility (moonlight and fog).

With all of its advantages, there are a few considerations that the sniper must keep in mind when using telescopes. The telescopic sight will never make a poor shooter any better. The only advantage to the telescopic sight is that the target and the reticle are on the same focal plane, and the magnification provides a more distinct aiming point. The magnification is also a disadvantage, as it also magnifies aiming and holding errors. Although technically there is no sight alignment with the telescopic sight, if the eye is not centered on the scope, shadowing will occur. This error will have the same effect as improper sight alignment. The bullet will strike at a point opposite the shadow and will increase in error as the distance increases.

Improper head placement on the stock is the main cause of shadowing. Due to the scope being higher than the iron sights, it is difficult to obtain a good solid stock weld. If this is a problem, temporary cheek rests can be constructed using Kotex, T-shirts, or any material that can be removed and replaced. This will assist the sniper in obtaining a good stock weld and will help to keep his head held straight for sighting.

Aiming With Telescopic Sights

A telescopic sight allows aiming without using the organic rifle sights. The line of sight is the optical axis that runs through the center of the lens and the intersection of the cross hairs. The cross hairs and the image of the target are in the focal plane of the lens (that plane which passes through the lens focus, perpendicular to the optical axis). The sniper's eye sees the cross hairs and the image of the target with identical sharpness and clarity. To aim with a telescope, the sniper must position his head at the exit pupil of the telescope eyepiece so that the line of sight of his eye coincides with the optical axis of the telescope. He then centers the cross hairs on the target.

Eye Relief

In aiming, the eye must be located 3 to 3 3/4 inches from the exit pupil of the eyepiece. This distance, the eye relief, is

fairly large, but it is necessary to ensure safety from recoil and to obtain a full field of vision.

Shadow Effects

During aiming, the sniper must ensure that there are no shadows in the field of vision of the telescope. If the sniper's eye does not have proper eye relief, a circular shadow will occur in the field of vision, reducing the field-of-vision size, hindering observation, and in general, making aiming difficult. If the eye is positioned incorrectly in relation to the main optical axis of the telescope (shifted to the side), crescent-shaped shadows will occur on the edges of the eyepiece. They can occur on either side, depending upon the position of the axis of the eye with respect to the optical axis of the telescope. If these crescent-shaped shadows are present, the bullets will strike to the side away from them. This error is the same as a sight alignment error with iron sights.

Head Adjustments

If the sniper notices shadows on the edges of the field of vision during aiming, he must find a head position in which the eye will see clearly the entire field of vision of the telescope. Consequently, in order to ensure accurate aiming with a telescope, the sniper must direct his entire attention to keeping his eye on the optical axis of the telescope, and he must have the intersection of the cross hairs coincide exactly with the aiming point. However, his concentration must be on the cross hairs and not the target. It is important not to stare at the cross hairs while aiming.

Canting

Canting is the act of tipping the rifle to either side of the vertical, causing misplaced and erratic shot grouping.

Point of Aim

The point of aim should not be the center of mass, unless required by the situation. The best point of aim is anywhere within the triangle formed by the the base of the neck and the two nipples (Figure 3-4-7). This will maximize the probability of hitting major organs and vessels, and rendering a clean one-shot kill. The optional point of aim if the upper chest hold is not available is the centerline below the belt. The pelvic girdle is rich in major blood vessels and nerves. A hit here will cause a mechanical collapse or mechanical dysfunction. This is also an advantage if the target is wearing body armor, which usually only covers the upper chest. The final point of aim is the head hold (Figures 3-4-8,9,10). This is very difficult to achieve because of its size and constant motion. The advantage of the head hold is incapacitation well under 1 second if the correct placement is achieved. This hold is well suited for hostage situations where closer ranges are the norm, and instant incapacitation is required. The exact hold is along the plane formed by the nose and the two

ear canals. The target is the brain stem, to severe the spinal cord from the medulla oblongata. Note that the point of aim is not the forehead nor between the eyes. This would result in a hit that is too high.

What the sniper is trying to severe or pulverize is the target's brain stem, the location where the spinal cord connects to the brain. Nerves that control motor function are channeled through here, and the lower third of the stem (the medulla) controls breathing and heartbeat. Hit here, the target will not experience even reflexive motor action. His entire body will instantly experience what is called "flaccid paralysis"; all of his muscles will suddenly relax, incapable of any motion of any kind thereafter. The sniper can tell how successful his head shot was by watching how his target falls. If the terget goes straight down, limp, or pitches forward, there is a high assurance of fatality. If the target falls to the side, the target has only been partially incapacitated.

For a chest shot that is ideally placed mid-sternum, the bullet will strike the largest and hardest of the bones overlying the vital organs. When the bullet strikes and severs the terget's spine, his legs will buckle under flaccid paralysis. His arms, however, may not be incapacitated instantly. With a chest shot, even though the suspect may technically be "dead" from the devastation of the round, there may be a brief and dangerous delay before he acts dead. His brain may not die for one to two minutes after his heart has ceased to function. During this time, his brain may command his arms to commit a simple, final act. The sniper anticipates these possibilities and delivers an immediate second round if the suspect is not fully down and out and/or anyone is within his sphere of danger.

3-5. BREATH CONTROL

Breath control is important to the aiming process. If the shooter breathes while trying to aim, the rise and fall of his chest will cause the rifle to move vertically. Sight alignment is accomplished while the shooter is breathing, but he must be able to hold his breath to complete the process of aiming. To properly hold his breath, the shooter inhales, exhales normally, and stops at the moment of natural respiratory pause. If the shooter does not have the correct sight picture, then he must change his position.

A respiratory cycle lasts four to five seconds. Inhalation and exhalation require only about two seconds. Thus, between each respiratory cycle, there is a pause of two to three seconds. This pause can be expanded to 12 to 15 seconds without any special effort or unpleasant sensation; however, the maximum safe pause is 8 to 10 seconds. The shooter must fire the shot during an extended pause between breaths or start the process over again. During the

respiratory pause, the breathing muscles are relaxed, and the shooter thus avoids straining the diaphragm (Figure 3-5-1).

A shooter should assume his position and breathe naturally until his hold begins to settle. Many shooters then take a slightly deeper breath, exhale and pause, expecting to fire the shot during the pause. If the hold does not settle sufficiently to allow the shot to be fired, the shooter resumes normal breathing and repeats the process.

The respiratory pause should never feel unnatural. If the pause is extended for too long, the body suffers from oxygen deficiency and sends out signals to resume breathing. These signals produce slight involuntary movements in the diaphragm and interfere with the shooter's ability to concentrate. The heart rate also increases and there is a decrease of oxygen to the eyes. This causes the eyes to have difficulty focusing and this results in eye strain. During multiple, rapid-fire engagements, the breathing cycle should be forced through a rapid, shallow cycle between shots instead of trying to hold the breath or breathing. Firing should be accomplished at the forced respiratory pause.

The natural tendency of the weapon to rise and fall during breathing allows the sniper to fine tune his aim by holding his breath at the point in which the sights rest on aiming point.

3-6. TRIGGER CONTROL

Trigger control is the most important component of the sniper marksmanship fundamentals. It is defined as causing the rifle to fire when the sight picture is at its best, without causing the rifle to move. Trigger squeeze, on the other hand, is defined as the independent action of the forefinger on the trigger, with a uniformly increasing pressure straight to the rear until the rifle fires. Trigger control is the last task to be accomplished before the weapon fires. It is more difficult to apply when using a telescope or when a firing position becomes less stable. Misses are usually caused by the aim being disturbed as the bullet leaves the barrel, or just before it leaves the barrel, and is the result of a shooter jerking the trigger or flinching. The trigger need not be jerked violently to spoil the aim; even a slight, sudden pressure of the trigger finger is enough to cause the barrel to waver and spoil the sight alignment. Flinching is an involuntary movement of the body--tensing of the muscles of the arm, the neck, or the shoulder in anticipation of the shock of recoil or the sound of the rifle firing. A shooter can correct these errors by understanding and applying proper trigger control.

Proper trigger control occurs when the sniper places his firing finger as low on the trigger as possible and still clears the trigger guard, thereby achieving maximum mechanical advantage.

The aniper engagea the trigger with that part of hia firing finger that allowa him to pull the trigger atraight to the rear. A firm grip on the rifla atock is eaaential for trigger control. If the aniper begina hia trigger pull from a loose grip, he tends to aqueeze the atock aa well aa the trigger and thua loaea trigger control. To avoid tranaferring movement of the finger to the entira rifle, the anipar ahould aee daylight between the trigger finger and the atock aa he aqueezea the trigger, atraight to the reer. To enaure a well-placed ahot, he firea the weapon when the front blade or reticle ia on the desired point of aim.

The aniper maintaina trigger control best by aasuming e atable position, adjuating on the target, end beginning a breathing cycle. Aa the aniper exhalea the final breath toward a natural reapiratory pauae, he aecurea hia finger on the trigger. On the M21, he will take up the alack in the trigger until reaiatance ia felt. Aa the front blada or reticle aettles on the deaired point of aim, and the natural reapiratory pauae ia entered, tha anipar applies initial preaaure. He increaaes the tenaion on the trigger during tha reapirstory pauae aa long aa the front blade or raticle remaina in tha area of the target that enaurea e well-placed ahot. If the front blade or reticle movea away from the deaired point of aim on tha targat, and the pauae ia free of atrain or tenaion, tha aniper atopa increaaing tha tanaion on tha trigger, waita for the front blada or reticle to return to the deaired point, and than continuea to aqueeze the trigger. The ahooter perfecta hia aim while continuing tha ateadily increaaing preaaure until the hammer falla. Thia ia trigger control. If movement ia too larga for recovery or if the pauae haa become uncomfortabla (extended too long), tha aniper ahould carefully releaae the pressure on tha trigger and bagin the raapiratory cycle again.

Moat aucceaaful anipera agree that tha trigger alack ahould be taken up with a heavy initial preaaura. Concentration ahould be focuaed on the perfection of the aight picture aa trigger control ia automatically applied. Concentretion, eapacially on the front aight or rsticle ia tbe greateat aid to prevent flinching and jerking.

The methoda of trigger control involve a mantal proceaa, while pulling the trigger ia a mechanical proceaa. Two methoda of trigger control are uaed to pull the trigger: the amooth motion or conatant preaaure trigger pull and the interrupted trigger pull.

o Smooth Motion/Conatant Preaaure Trigger Pull. In the amooth motion trigger pull the ahooter takea up the alack with a haavy initial preaaure and, when the aight picture settlaa, pulla tbe trigger with a aingla, amooth action. Thia method ia uaed when tbere ia e atationary target end the position is steady. Thia type of trigger control will help prevent flinching, jerking, and bucking the weapon.

o Interrupted Trigger Pull. In the interrupted trigger pull the shooter applies pressure to the trigger when the sight picture begins to settle, and as long as the sight picture looks good or continues to improve. If the sight picture deteriorates briefly, the shooter maintains the pressure at a constant level and increases it when the picture again begins to improve. This technique is used in the standing position due to the lack of stability of the position, and the sniper may apply smooth motion trigger pull or pressure. This is necessary because of the wobble area or wavering of the sights around, through, or in the target or aiming point due to the instability of the position. If, while controlling the pressure, an error occurs in the sight alignment or sight picture that is great enough to cause the shot to miss the target, the sniper holds the pressure that he has on the trigger until the correct sight alignment or sight picture is reestablished. He then continues the pressure or repeats this technique until he fires the rifle. The sniper does not jerk the trigger when the sights are aligned and the "perfect" sight picture occurs.

Another type of trigger control that is not really separate from the previous two is called the "Infantry Trophy trigger pull." This is only applicable to semiautomatic weapons. It is extremely effective during multiple engagements, or when time is critical. After engaging the first target, the sniper maintains the pressure on the trigger with his trigger finger. During the forced inhalation of the breathing cycle, the sniper gently releases the pressure slightly on the trigger until he feels the gear engage. This is usually indicated by a tactile and audible click. He then enters the normal cycle of the trigger control, perfecting the sight picture until the next shot is released. This is continued until the sniper is out of targets or ammunition. This technique minimizes the distance that the trigger and trigger finger must travel between shots.

Trigger control is not only the most important fundamental of marksmanship but also the most difficult to master. The majority of shooting errors stem directly or indirectly from the improper application of trigger control. Failure to hit the target frequently results from the sniper jerking the trigger or applying pressure on both the trigger and the side of the rifle. Either of these actions can produce a miss. Therefore, instructors should always check for indications of improper trigger control, since an error in this technique can start a chain reaction of other errors. Some of the indications of improper trigger control are:

o Flinching. Flinching is an involuntary muscular reaction or tension in anticipation of recoil or muzzle blast. It is indicated by moving the head, closing the eyes, tensing the non-firing arm, moving the shoulders to the rear, or a combination of these.

o Bucking. Bucking is an sttampt to nnticipnte and teke up the recoil before it occurs by tenaing the shoulder muscles end moving the shoulder forward.

o Jarking. Jerking is en sttempt to make the rifle fire st a certain inatant by rspidly applying pressure on the triggar.

Trigger control cen be deveioped into a raflex ection. The snipar cen develop his trigger contrnl to the point thnt pulling the trigger requires no conacioua effort. The sniper will ba nwnre of the pull, but he will nnt be consciously directing it. Everyone exhibits thia type of reflex sction in daily liviog. The individuel who welks or drivea a car whiie csrrying on a converssation is an example. He is aware of his muscular activity, but is not plannaing it. He is thinking about the converaetion.

Trigger controi ia tsught io conjunction with poaitions. When positions and trigger control sre beiog taught, sn effective treining aid for demonstrsting tha tachnique of triggar control with rafarence to the interrupted or controlled prassure, is the wobble sight sod terget simulator. The wobble sight msy be used with s fixed target simulstor to demonetrets wobbls eree, edjustment of neturs1 point of sim, breathiog, snd triggar control.

In ell positione, dry firing is ons of the best methods of developing proper trigger oontrol. In dry firing, not only is the coech sble to detact srrors, but the individusl shooter is eble to detsot his own errors, sioce there is no rscoil to conceel the rifls's undssirsble movemeots. Where possible, triggar control prectice ehould be integreted into s11 phasss of marksmanship trsining. The mastery of triggar control takes petienca, herd work, conoentretion, end s grest deal of eelf-discipline.

3-7. THE INTEGRATED ACT OF FIRING ONE ROUND

Once the sniper hae been taught the fundamentels of merkamanship, hia primary concern ia to appiy this knowladge in the performanca of his mission. An effective mathod of epplying fundnmentsls is through the use of the integrated sct of firing one round. The intagrated sct is a logicai, etep-by-step davalopment of the fundamantals, wheraby the sniper develops habits to fira esch shot exactly the aama. Thus he echievaa the markamanship goal that a aniper must atrive for: "ona shot--one kill."

The integrsted sct of firing can be divided into four distinct pheaea:

Preparation Phase. Befnre departing the prsparation aree, the sniper ensures thet:

o The team is mentally conditioned and knows what mission they are to accomplish.

o A systematic check is made of equipment for completeness and serviceability including, but not limited to:

* Properly cleaned and lubricated rifles.

* Properly mounted and torqued scopes.

* Zero-sighted systems and recorded data in the sniper data book.

* The study of weather conditions to determine their possible effects on the team's performance of the mission.

Before-Firing Phase. On arrival at the mission site, the team exercises care in selecting positions. The sniper ensures that the selected positions complement the mission's goal. During this phase, the sniper:

o Maintains strict adherence to the fundementals of position. He ensures that the firing position is as relaxed as possible, making the most of available external support. He also makes sure the support is steble, confirms to the position, and allows a correct, natural point of aim for each daaignated area or target.

o Once in position, he remove the scope cavers and checks the field(s) of fire, making any needed corrections to ensure clear, unobstructed firing lanes.

o Makes dry-firing and natural point of aim checks.

o Double-checks ammunition for serviceability and completes final magazine loading.

o Notifies the observer he is ready to engage targets. The observer must be constantly aware of weather conditions that may affect the accuracy of the shots. He must also stay ahead of the tactical situation.

Firing Phase. Upon detection, or if directed to a suitable target, the sniper makes appropriate sight changes, aims, and tells the observer he is ready to fire. The observer then gives the needed windage and observes the target. To fire the rifle, the sniper should remember the key word, "BRASS". Each letter is explained as follows:

o Breathe. The sniper inhales and exhales to the natural respiratory pause. He checks for consistent head placement and stock/spot weld. He ensures eye relief is correct (full field of view through the scope; no shadows present.) At the same time, he

begins sligning the croas hairs or froot blade with the target st the dssired point of eim.

o Relsx. As the soiper exhales, he relsxea as msny muscles es possible, while maiotaioing control of the wespon end position.

o Aim. If the soiper has a good, neturs1 point of sim, the rifls points st the desired target during the reapiretory psuse. If the eim is off, the sniper should make s slight edjustment to scquire the desired point of eim. He evoids "muscling" the wespon towsrd the siming point.

o Slsck. The first stage of the two-stage trigger (the slsck, M21 ooly) must be takeo up with heavy initsl pressure. Most sxperiencsd snipers ectually take up the slsck snd get initial pressure es they reach the respiretory pause. In this wey, the limitsd durstion of the peuse is not used up by manipuleting the slsck io the trigger.

o Squeeze. Ae long es the sight picture is estisfectory, the soiper should equeeze the trigger. The pressure spplied to the trigger must be strsight to the reer without disturbing the lsy of the rifle or the desired point of eim.

After-Firing Phase. The sniper's efter-firing ections include observing the terget eree to certify the hit, observing the enemy resction, scquiring enother terget, end evoiding compromise of his positioo. The sniper must enelyze hie performsnce. If the shot impacted st the desired spot (e terget hit), it mey be sssumed the integreted eot of firing one round wes correctly followed. If, however, the shot wes off cell, the sniper end observer must check for poesible errors.

o Fsilure to follow the key word, BRASS (pertiel field of view, breeth held incorrectly, trigger jerked, rifle muscled into position, end so oo).

o Tsrget improperly renged with scope (cousiog high or low shots).

o Iocorrectly compensstad for wind (csusing right or left shots).

o Possible weapon/emmunition malfunctioo (used only ss a lsst rssort whsn no other errors ere detected).

Once the probsble reesoos for an off-call shot is detsrmined, the sniper must make note of the errore. He psys closs sttentioo to the problem areas to incressa the eccurscy of future shots.

Follow-through

Applying the fundamentals increases the odds of a well-aimed shot being fired. When mastered, additional skills can make that first-round kill even more of a certainty. One of these skills is the follow-through.

Follow-through is a continued mental and physical application of the fundamentals after each round is fired. It is the act of continuing to apply all of the sniper marksmanship fundamentals as the weapon fires as well as immediately after it fires. It consists of:

- Keeping the head in firm contact with the stock (stock weld).
- Keeping the finger on the trigger all the way to the rear.
- Continuing to look through the rear aperture or scope tube.
- Keeping muscles relaxed.
- Avoiding reacting to recoil and/or noise.
- Releasing the trigger only after the recoil has stopped.

Good follow-through ensures that the weapon is allowed to fire and recoil naturally. The sniper/rifle combination reacts as a single unit to such actions. From a training viewpoint, follow-through may allow the sniper to observe the strike of his bullet in relation to his aiming point and help him rapidly correct and adjust his sights for a second shot. Also, a good follow-through will indicate to the sniper the quality of his natural point of aim. The weapon should settle back on target. If it does not, then muscles were used to get the weapon on target.

Calling the Shot

Calling the shot is being able to tell where the round should impact on the target. Because live targets invariably move when hit, the sniper will find it almost impossible to use his telescope to locate the target after the round is fired. Using iron sights, the sniper will find that searching for a downrange hit is beyond his abilities. He must be able to accurately call his shots. Proper follow-through will aid in calling the shot. The dominant factor in shot calling is, however, where the reticle or post is located when the weapon discharges. This location is called his final focus point.

With iron sights, the final focus point should be on the top edge of the front sight blade. The blade is the only part of the sight picture that is moving (in the wobble area). Focusing on it

aids in calling the shot and detecting any errors in sight alignment or sight picture. Of course, lining up the sights and the target initially requires the sniper to shift his focus from the target to the blade and back until he is satisfied that he is properly aligned with the target. This shifting exposes two more facts about eye focus. The eye can instantly shift focus from near objects (the blade) to far objects (the target). The eye cannot, however, be focused so that two objects at greatly different ranges (again the blade and target) are both in sharp focus. After years of experience, many snipers find that they no longer hold final focus on the front sight blade. Their focus is somewhere between the blade and the target. This act has been related to many things, from personal preference to failing eyesight. Regardless, inexperienced snipers are still advised to use the blade as a final focus point.

The final focus is easily placed with telescopic sights because of the sight's optical qualities. Properly focused, a scope should present both the field of view and the reticle in sharp detail. Final focus should then be on the target. While focusing on the target, the sniper moves his head slightly from side to side. The reticle may seem to move across the target face, even though the rifle and scope are motionless. This movement is <u>parallax</u>. Parallax is present when the target image is not correctly focused onto the reticle's focal plane. Therefore, the target image and the reticle appear to be in two separate positions inside the scope, causing the effect of reticle movement across the target. A small amount of parallax is unavoidable throughout the range of the ART series of scopes. The M3A on the M24 has a focus/parallax adjustment that eliminates parallax. The sniper should adjust this knob until the target's image is on the same focal plane as the reticle. To determine if the target's image appears at the ideal location, the sniper should move his head slightly left and right to see if the reticle appears to move. If it does not move, the focus is properly adjusted and no parallax is present.

In calling the shot, the sniper predicts where the shot will hit the target. The sniper calls the shot while dry firing and actual firing by noting the position of the sights in relation to the aiming point the instant the round is fired. If his shot is not on call, the sniper must review the fundamentals to isolate his problem or make a sight change as indicated to move his shot to his point of aim. Unless he can accurately call his shots, the sniper will not be able to effectively zero his rifle.

3-8. DETECTION AND CORRECTION OF ERRORS

During the process of teaching or using the fundamentals of marksmanship, it will become evident that errors may plague any shooter. When an error is detected, it must be corrected.

Sometimes errors are not obvious, and this is when a coach or instructor will be invaluable. The procedure for correcting errors is to pinpoint or isolate the error, prove to the sniper that he is making this error, and convince him that through his own efforts and concentration he can correct his error. Knowing what to look for through analysis of the shot groups, observation of the sniper, questioning of the sniper, and review of the fundamentals of training exercises will assist the coach in this process

Target Analysis

Target or shot group analysis is an important step in the process of detection and correction of errors (Figure 3-8-1). When analyzing a target, errors in performance should be correlated to loose groups, the shape of groups, and the size of groups. With some snipers, especially the experienced, this cannot be done readily. However, the coach must be able to discuss the probable error. A bad shot group is seldom caused by only one error. It should also be remembered that in the initial analysis of groups, the coach must take into consideration the capabilities of the sniper as well as those of the weapon and the ammunition.

Observation of the Sniper

When the coach or instructor has an indication that the sniper is committing one or more errors, it will usually be necessary for the coach or instructor to observe this sniper while he is in the act of shooting to pinpoint his errors. If the coach or instructor has no indication of the sniper's probable errors, the initial emphasis should be on firing position and breath control. Next, the coach or instructor should look for the most common errors--anticipation of the shot and improper trigger control. If observing the sniper fails to pinpoint his errors, the coach or instructor must then question him.

Questioning the Sniper

The coach or instructor should ask the sniper if he can detect his errors. He should have the sniper explain the firing procedure, to include position, aiming, breath control, trigger control, and follow-through. If questioning does not reveal all of the errors, the coach or instructor should talk the sniper through the correct procedure for firing one round.

Review the Fundamentals

The coach or instructor should talk the sniper through the following procedures: setting the sights, building the position, aligning the sights, checking the natural point of aim, adjusting the natural point of aim, controlling the breath, obtaining a sight picture, focussing on the front sight, controlling the trigger, follow through, and calling the shot. If errors still exist, there are several training exercises that can help to pinpoint them.

Training Exercises

These training exercises or devices can be used at any time to supplement the detection procedure. (See FM 23-8, M14 and M14A1 Rifles and Rifle Marksmanship).

- Trigger exercise.
- Metal disk exercise.
- Bell and dummy exercise.
- Blank target firing exercise.
- M2 aiming device.
- Air rifles.

When the sniper leaves the firing line, he compares weather conditions to the information needed to hit the point of aim/point of impact. Since he fires in all types of weather conditions, he must be aware of temperature, light, mirage, and wind. The sniper must consider other major points or tasks:

- Compare sight settings with previous firing sessions. If the sniper always has to fine-tune for windage or elevation, there is a chance he needs a sight change (slip a scale).
- Compare ammunition by lot number for the best rifle and ammunition combination.
- Compare all groups fired under each condition. Check the low and high shots as well as those to the left and the right of the main group--the less dispersion, the better. If groups are tight, they are easily moved to the center of the target; if loose, there is a problem. Check the telescope focus and make sure the rifle is cleaned correctly. Remarks in the data book will also help.
- Make corrections. Record corrections in the data book, such as position and sight adjustment information to ensure retention.
- Analyze a group on a target. This is important for marksmanship training. The firer may not notice errors during firing, but errors become apparent when analyzing a group. This can only be done if the data book has been used correctly.

A checklist that will aid in shot group/performance analysis follows:

* Group tends to be low and right.

- Left hand not positioned properly.
- Right elbow slipping.
- Improper trigger control.

* Group scattered about the target.
  - Improper trigger control.
  - Incorrect eye relief, sight picture/alignment.
  - Failure to focus on the front sight (iron sights).
  - Stock weld changed.
  - Unstable firing position.

* Good group with several erratic shots.
  - Flinching. Shots may be anywhere.
  - Bucking. Shots from 7 to 10 o'clock.
  - Jerking. Shots may be anywhere.

* Group strung up and down through the target.
  - Breathing while firing.
  - Improper vertical alignment of sights.
  - Stock weld changed.
  - Bad lot of ammunition.

* Compact group out of the target.
  - Incorrect zero.
  - Failure to compensate for wind.
  - Bad natural point of aim.
  - Scope shadow.

* Group center of the target out the bottom.
  - Scope shadow.
  - Position of the rifle changed in the shoulder.

- Sling sliding down the arm.
- Position too low.

* Horizontal group across the target.
  - Scope shadow.
  - Canted weapon.
  - Bad natural point of aim.
  - Incorrect sight alignment.
  - Failure to compensate for changing winds.
  - Loose position.
  - Muscling the rifle.

As the stability of a firing position decreases, the wobble area increases. The larger the wobble area, the harder it is to fire the shot without reacting to it. This reaction occurs when the sniper:

o Anticipates recoil. The firing shoulder begins to move forward just before the round fires.

o Jerks the trigger. The trigger finger moves the trigger in a quick, chopping, spasmodic attempt to fire the shot before the front blade or reticle can move away from the desired point of aim.

o Flinches. The sniper's entire upper body (or parts thereof) overreacts to anticipated noise or recoil. This is usually due to being unfamiliar with the weapon.

o Avoids recoil. The sniper tries to avoid recoil or noise by moving away from the weapon or closing the firing eye just before the round fires. This, again, is caused by a lack of knowledge of the weapon's actions upon firing.

3-9. APPLICATION OF FIRE

Following the Austrian-Prussian War of 1866, the Prussian Army began a systematic study of the effectiveness and control of small arms fire. The result of this study, conducted over a six-year period, was the introduction of the science of musketry, a misnomer as all major armies were by then equipped with rifles. Musketry is the science of small arms fire under field conditions, as opposed to range conditions, and is concerned entirely with firing at unknown distances; thus, the importance of the study of musketry to

the sniper. The materiel presented is merely an overview of the fundamentals of musketry. At the peak of the study of musketry as a martial science, schools of musketry often extended their courses to six weeks duration. Only the introduction of machine guns and automatic small arms precipateted the doctrine of its study, although various aspects of musketry were retained as separate subjects, such as judging distances and issuing fire control orders. This ties together the scattered remnents of the study of musketry as it pertains to sniping.

All weapon sights are constructed with a means of adjustment. Although the technicalities of adjustment may vary with weapon type, or means of sighting, generally the weapon sight will be correctable for windage and elevation. The specific method by which adjustment is accomplished is angular displacement of the sight in relation to the bore of the rifle. This angular displacement is measured in minutes of angle (MOA).

Minute of Angle

A minute of angle is the unit of angular measure which subtends 1/60 of 1 degree of arc. With few exceptions the universal method of weapon sight adjustment is in fractions, or multiples, of minutes of angle. A minute of angle subtends a distance of 1.0472 inches at 100 yards and 2.8 centimeters at 100 meters. Since a minute of angle is an angular unit of measure, the arc subtended by a minute of angle increases proportionately with distance (Figure 3-9-1).

It is recognized that fractions are difficult to work with when making mental calculations. For this reason the conventional dictum of shooters that assumes one minute of angle is the equivalent of 1 inch at 100 yards will be followed. It will also be assumed that one minute of angle is the equivalent of 3 centimeters at 100 meters. By rounding off the angular displacement of the minute of angle in this manner, only one-half inch of accuracy at 1,000 yards and 2 centimeters at 1,000 meters is lost. Data will be presented in both the English and the Metric system. This will permit the sniper to use whichever system he is most comfortable with.

Sight Corrections

With the knowledge of how much the displacement of one minute of angle at a given distance is, it is now possible to calculate sight corrections. All that the sniper needs to know is how many minutes of angle, or fractions of a minute of angle, each sight graduation (known as "clicks") equals. This is dependent on the type of sight used.

To determine the amount of correction required in minutes of angle for the English system, the error in inches is divided by the range expressed in whole numbers. The correction formula is:

$$\text{MINUTES} = \frac{\text{(ERROR) (inches)}}{\text{RANGE (expressed in whole numbers)}}$$

To determine the amount of correction required in minutes of angle using the metric system, the error in centimeters is divided by the range expressed in whole numbers, then the resultant is divided by 3. The correction formula is:

$$\text{MINUTES} = \frac{\text{ERROR (centimeters)}}{\text{RANGE (expressed in whole numbers) x 3}}$$

There will arise occasions when the impact of a shot is observed, but there is no accurate indication of how much the error is in inches or centimeters. Such occasions may occur when there is a great distance between the aiming point and the impact point or when there is a lack of an accurate reference. It is possible to determine the distance of the impact point from the point of aim in mils, then to convert the mils to minutes of angle. The conversion factor is:

1 MIL = 3.375 MINUTES OF ANGLE

EXAMPLE: When a round is fired the impact of the round is observed to be several feet to the right of the target. The observer notes the impact point and determines it to be 2 mils to the right of the aiming point.

3.375 x 2 = 6.75 MINUTES

The table below gives the inch equivalents of mils at the given ranges of 91 meters to 1,000 meters and 100 yards to 1,000 yards. This will aid the sniper in computing his sight changes in mils for a given distance to the target with a given miss in estimated inches. For example, a miss of 28 inches left at 400 yards would be a 2 mil hold to the right.

MIL VALUE

RANGE	INCHES	RANGE	INCHES
91 metere (100 yds)	3.6	549 metere (600 yds)	22.0
100 metere	4.0	600 metere	24.0
183 metere (200 yds)	7.0	640 metere (740 yds)	25.0
200 metere	8.0	700 metere	27.5
274 metere (300 yde)	11.0	731 metere (800 yds)	29.0
300 metere	12.0	800 metere	31.5
365 meters (400 yds)	14.0	823 metere (900 yde)	32.5
400 metere	15.75	900 meters	35.5
457 metere (500 yds)	18.0	914 meters (1,000 yde)	36.0
500 metere	20.0	1,000 metere	39.0

METRIC/ENGLISH EQUIVALENTS

METRIC 1 MOA (CM)	YARDS	METERS/YARDS	METERS	ENGLISH 1 MOA (IN)
3	109	100	91	1
4.5	164	150	137	1.5
6	219	200	183	2
7.5	273	250	228	2.5
9	328	300	274	3
10.5	383	350	320	3.5
12	437	400	365	4
13.5	492	450	411	4.5
15	546	500	457	5
16.5	602	550	503	5.5
18	656	600	549	6
19.5	711	650	594	6.5
21	766	700	640	7
22.5	820	750	686	7.5
24	875	800	731	8
25.5	929	850	777	8.5
27	984	900	823	9
28.5	1039	950	869	9.5
30	1094	1000	914	10
31.5	1148	1050	960	10.5
33	1203	1100	1005	11

Ballistics, the study of projectiles in motion, can be broken down into three major areas. Interior or internal ballistic deals with the bullet in the rifle from primer detonation until it leaves the muzzle of the weapon. Exterior (also external) ballistics picks up after the bullet leaves the muzzle of the weapon and extends through the trajectory until the bullet impacts on the target or point of aim. Terminal ballistics is the study of what the bullet does upon impact with the target. Terminal velocity, location of the hit, and the bullet's design and construction will determine the effectiveness of the terminal ballistics.

When it is fired, a bullet travels a straight path in the bore of the rifle as long as it is confined in the barrel. As soon as the bullet is free of this constraint (exits the barrel), it immediately begins to fall, due to the effects of gravity, and its motion is retarded, due to air resistance. The path of the bullet through the air, as a result of these two influences, is called the bullet's trajectory.

If the barrel is horizontal, the forward motion imparted to the bullet by the detonation of the cartridge will cause it to travel in the direction of point A, but air resistance and the pull of gravity will cause it to strike point B (Figure 3-9-2). So as soon as the bullet is free from the constraint of the barrel, it begins to fall from the horizontal.

In order for point A to be struck, the barrel of the rifle must be elevated to some predetermined angle (Figure 3-9-3). The bullet's initial impulse will be in the direction of point C. However, because of initial angle, the bullet will fall, due again to air resistance and gravity, to point A. This initial angle is known as the angle of departure.

The size of the angle of departure depends on the shape of the trajectory and varies with the range or distance from the muzzle to the target, and for any given range, the angle of departure varies with the determining factors of the trajectory. The form of the trajectory is influenced by:

- The initial velocity (muzzle velocity).
- The angle of departure.
- Gravity.
- Air resistance.
- The rotation of the projectile (bullet) about its axis.

The relationship between initial velocity and air resistance is that the greater the amount of air resistance the bullet must

overcome, the faster the bullet slows down as it travels through the air. A bullet with a lower initial velocity will be retarded less by air resistance and will retain a greater proportion of its initial velocity over a given distance. This relationship is important in that a light projectile with a higher initial (or short range) velocity will have a "flatter" initial trajectory but will have less initial and retained energy with which to incorporate the target, will be deflected more by wind, and will have a steeper trajectory at longer ranges. A comparatively heavy projectile will have a lower initial velocity and a steeper initial trajectory, will not retain its energy over a great distance (retained energy is proportional to the mass of the projectile), will be deflected less by wind, and will have a "flatter" long-range trajectory.

Angle of departure is the angle to which the muzzle of the rifle must be elevated above the horizontal in order for the bullet to strike a distant point. When the bullet departs the muzzle of the rifle, it immediately begins to fall to earth due to the constant pull of gravity. The angle of departure increases the height the bullet must fall before it reaches the ground. If a rifle barrel were set horizontally in a vacuum, a bullet fired from the barrel would reach the ground at a distant point at the same moment that a bullet merely dropped from the same height as the barrel would reach the ground. Despite the horizontal motion of the bullet, its velocity in the vertical plane is constant (due to the constant effect of gravity). Angle of departure in the air, however, is directly related to the time of flight of the projectile in that medium. The greater the angle at which the projectile departs the muzzle, the more time in the air it will retain and, therefore, the further it will travel before it strikes the ground. However, at the 45 degree point, the effect of gravity causes the bullet to begin to lose distance.

The angle of departure is not constant. Although the angle of departure may remain fixed, a number of variables will influence the angle of departure in a series of shots fixed at the same given distance. The differences in the internal ballistics of a given lot of ammunition will have an effect. A muzzle velocity, within a proven lot, will often vary as much as 60 feet per second between shots. Imperfections in the human eye will cause the angles of departure of successive shots to be inconsistent. Imperfections in the weapon, such as a faulty bedding, a worn bore, or worn sight adjustments are variables. Errors in the way the rifle is held or canted will affect the angle of departure. These are just a few of the factors that cause differences in the angle of departure, and these are the main reasons why successive shots under seemingly identical conditions do not hit at the same point on the target.

Gravity as an influence on the shape of a bullet's trajectory is a constant force. It neither increases nor decreases over time or distance. It is present, but given the variable dynamics

influencing the flight of a bullet, it is unimportant. Given that both air resistance and gravity influence the motion of a projectile, the initial velocity of the projectile and the air resistance are interdependent and indirectly influence the shape of the trajectory.

The single most important variable effecting the flight of a bullet is air resistance. It is air resistance, not gravity, that determine the shape of a bullet's trajectory. If gravity alone were the determining factor, the trajectory would have the shape of a parabola, where the angle of fall would be the same (or very nearly so) as the angle of departure. The result of air resistance, however, is that the shape of the trajectory is an ellipse, where the angle of fall is steeper than the angle of departure.

The lands and grooves in the bore of the rifle impart a rotational motion to the bullet about its own axis. This rotational motion causes the projectile, as it travels through the air, to shift in the direction of rotation (in almost all cases to the right). This results in a drift that is caused by air resistance. A spinning projectile behaves precisely like a gyroscope. Pressure applied to the front of the projectile (air resistance) retards its forward motion but does not significantly upset its stability. However, upward pressure applied to the underside of the projectile, due to its downward travel caused by gravity, causes it to drift in the direction of spin. Fortunately, this drift is relatively insignificant at all but the greatest ranges (more than 1,000 yards).

Due to the combined influences just discussed, the trajectory of the bullet first crosses the line of sight (LOS) with a scarcely perceptible curve. The trajectory continues to rise to a point a little more than halfway to the target, called the maximum ordinate, beyond which it curves downward with a constantly increasing curve (possibly recrossing the LOS) until it hits the target (or ground). The point where the LOS meets the target is the point of aim (POA). The point where the bullet (trajectory) strikes the target is the point of impact (POI). Theoretically, the POA and the POI should coincide. In practical terms, because one or more of the influences discussed, they rarely do. The greater the skill of the shooter and the more perfect the rifle and ammunition, the more often these two points will coincide.

The part of the trajectory between the muzzle and the maximum ordinate is called the rising branch of the trajectory, while the part beyond the maximum ordinate is called the falling branch of the trajectory. It is with the falling branch that we are most concerned, for this part of the trajectory contains the target and the ground in its vicinity. In computing the height of the trajectory, assuming the LOS is horizontal, and at regular intervals (usually 100 yards) the height of trajectory is measured

and recordad aa the ordinate. The diatance from the muzzle to the ordinata known as the abaciaaa. The diatance in front of the muzzle, within which the bullet doea not riae higher than the object fired at, ia called the danger apace of the riaing branch of the trajectory. The falling branch of the trajectory alao containa a danger apace. The point where the bullet falla into the haight of the targat and continuea to the ground ia known aa the danger apace of the falling branch of the trajectory.

Aaauming that the point of aim ia taken at the center of the target, the extent of the danger apace ia dependent upon (Figure 7):

- Tha height of the firer, whether he ia atanding, kneeling, or prona.
- The haight of the target, whethar he ia atanding, kneeling, or prona.
- Tha "flatnaaa" of the trajactory--the belliatic propartiaa of tha cartridga usad.
- Tha angla of tha lina-of-aight--above or below tha horizontal.
- Tha alopa of tha ground whara tha targat reaidaa.

Tha point of aim alao haa a aignificant influanca on tha axtant of tha dangar apaca. If the point of aim ia takan at tha top of the targat, tha total dangar apaca will lia antiraly bahind tha targat. If tha point of aim ia takan at tha foot of tha target, tha total dangar apace will lia antiraly in front of tha targat. Thua, tha axtant of tha total danger apaca, inoluding tha target, will ba determinad by where the point of aim ia taken on tha target. Only whan the point of aim ia at tha canter of tha target will tha total danger apace (in relative terma) axtand an equal diatance in front of and behind the target.

Shot Groups

If a rifla ia fired a great number of timea under conditiona aa naarly uniform aa poaaihle, the bulleta atriking the target will group themaelvea about a central point called the center of impact and will form a circular or eliptical group. The dimenaiona and ahape of thia ahot group will vary, depending on tha diatance of the targat from the firer. The circle, or alipae, formed by theae ahota conatantly increaaea in aiza with the range. The lina connecting tha cantera of impact of all ahota at all rangaa meaaured ia callad the mean trajactory, and the core containing the circumferancaa of all the circlaa would mark the limita of the aheaf. The mean trajactory ia the average trajectory; all ordinates are compared to it, and anglea of departure and fall refer only to it.

The pattern on the target made by all of the bullets is called the ahot group. If the ahot group ia received on a vertical target, it ia called a vertical ahot group. If the group ia received on a horizontal target, it ia called a horizontel ahot group. A large number of ahota will form a ahot group heving the general ahape of an elipse, with ita major axia vertical. The ahota will be aymmatrically grouped ebout the center of impact, not naceaaarily about the point of aim. Tbey will be groupad more denaely near the canter of impact then at the edges, and half of all tha ahota will be found in e atrip approximately one-fourth the aiza of the whole group. Tbe widtb of thia atrip ia called the mean (or the 50 percent diaperaion) vertical if measured verticaily, or the mean lataral if maaaurad iaterally.

When conaidaring the horizontai ahot group, the mean lateral diaperaion retaina ita aame aignificence, but what ia called the meao vartical diaperaion on a verticel targat ia known aa the mean longitudinal diaperaion on e horizontai target. Thare ia a aignificant relationehip between the aize, or dimeoaiona, of a ahot group and tha aize, or dimenaiona, of the target fired at. With a ahot group of fixad dimenaiona, when the target ia mada aufficiently larga, aii ahota fired wiil etrika the target. Coovereely, with a very amali target, only e portion of tha ahota fired will etrike tha target; the reet of the ahota will paae over, under, or to the aidaa of tha target.

It ia evident that the entire etudy of the practical applioation of axterior baiiiatice--hitting a targat of variabla dimenaione et unknown diatencee--ia one of the probability of a ehot group of fixed dimenaiona (the firar'a grouping ability) conforming to tha dimenaions of e given terget. Added to thia probability ia tha abiiity of the firer to compenaata for environmental conditions and maintain en accurate zero.

One of the graateat paredoxea of aniping ia that en average merkaman haa a greater probabiiity of bitting tergeta at uokoown diatancaa than a good marksman if their reapectiva abilitiea to judge diatancea and anvironmental conditiona and maintain an accurate zero are aquai. (The claaaification of "good merkaman" and an "avarage markaman" refera only to the ahooter'a grouping ability.) A good markaman who haa miacaicuiated wind or who ia not accurately zeroed would expect to miaa the target antirely. An average merkaman, under identical conditiona, would expect to obtain at ieaat a few hita on the target; or if only one shot were fired, would have a bigh probabiiity of obtaining a firat-round hit. The above atatement doea not mean that average marksmen make better aoipera. It doea mean thet the better the individual ahoots (the bettar hia grouping ability ia), the more preciae his ability to judga diatance, caiculate wind, and maintain his zero muat be.

The entire atudy of practicel exterior balliatics is the atate of applying e shot group or a sheaf of ahota over en estimated

distsnce agsinst n tsrget of unknown or estimsted dimenaions snd sstimating the probability of obtaining a hit with a aingle ahot contninsd within the ahesf of ahots previoualy determined through shot group prscticss.

Influsnce of Ground on the Shot Group (Sheaf of Shots)

When firing at tsrgeta st unknown distsnces under field conditions, the sniper must taken into considerstion the lsy of the ground and how it will affect hia probable chances of hitting the tsrget aimed at. Gsnerally, the ground s sniper fires over will:

- Be level.
- Slops upward.
- Slopa downward.

As diacussed previously, danger apace is tha diatsnce meaaured above the line of aight within which the trajactory doea not riae abova the higheat point of tha targat nor fall below ita lowaat point. Tha extant of the danger apace depends on:

- Ths ralationahip between tha trajactory and tha lina of aight, or nngla of fall, and tharefore on the ranga curvatura of the trajectory.
- Tha height of the target.
- The point of aim--the point where tha line of aight meata tha targat.
- Tha point of impact.

NOTE: Tha longer the range, the ahorter the danger apsce, dua to the incrsssing curvsture of the trajectory.

The diaplecing of the center of impact from the center of the target is a fsctor that must also be considered; it will oftsn be the controlling fsctor. The danger apace st rsnges under 700 ysrds ia affscted by the position of the firer (height of the muzzle above the ground). The danger apacs increases ss the height of the muzzle decressea. At longer rsngea, no material effect is felt from different poaitions of tba firer.

The influence of the ground on computing hit probability on a target at unknown diatsnces resulta in the nsceasity of distinguishing between dsnger space and swept space (which are functions of the mean trsjectory) and between these (dnnger apsce and awspt apncs) and the dsngerous zone (which is s function of the whols or a psrt of the cone of fire). For a given height of target and point of aim, the danger apace is of fixed dimensiona, while the swept space varies in relstion with the slope of the ground.

Swept epace ie ehorter on riaing ground and longer on falling ground than the danger apace. All the functions of the dangerous zone, auch ee the denaity of the group et e given dietance from the center of impact, are correspondingly modified.

3-10. BALLISTICS

Ae applied to aniper marksmanehip, balliatics may be defined ae the atudy of the firing, flight, and effect of ammunition. Proper execution of markemenehip fundamentale and e thorough knowledge of hallietica enaure the eucceeaful completion of the miaaion. Tahlea and formulaa in thia aection ehould he uaed only ae guidelinea aince every rifle performs differently. Maximum belliatica data eventually reault in a well-kept deta book and knowledge gained through experience.

Typea of Ballistica

Ballietica may he divided into three diatinct typea: internal, axternal, and terminal.

- Internal. The intarior workinga of a weapon and tha funotioning of ita ammunition (what happana in the harrel).
- External. The flight of the bullat from the muzzle to tha targat.
- Tarminal. What happens to tha bullat after it hits the targat.

Terminology

To fully underatand ballietica, tha aniper ahould he familiar with tha following terms:

Muzzle velocity--The apeed of a bullat aa it leeves tha rifle barrel, meeaured in feet per aecond (fps). It variea according to varioua factora, auch aa ammunition type and lot number, temperature end humidity.

Line of Sight--A atraight line from the eye through the aiming device to the point of eim.

Line of Departure--The line defined by the bore of the rifle or the peth the hullet would take without gravity.

Trajectory--The peth of the bullet aa it fliea to the target.

Midrenge Trajectory/Maximum Ordinete--The highest point the bullet reechea on ita wey to the target. Thia point muat be known to engage a target that requirea firing underneath an overhead obstacle, auch ee a bridge or a tree. Inattention to midrange

trajectory may cause the aniper to hit the obstacle instesd of the target.

Bullet Drop--How far the bullet dropa from the line of departure to the poiet of impact.

Time of Flight--The smount of time it takea for the bullet to reach the target from the time it exita the rifle.

Retained Velocity--The apeed of the bullet when it reachea the target. Due to drag, the velocity will be reduced.

Effacta on Trajectory

Mastery of markamanahip fuedameetala and field skills is not the only requirementa for being a aeiper. Some of the factora thst have sn influence on the trajectory are:

o Grsvity. The sniper would not hsve a maximum range without gravity. A fired bullet would continue to move much the same ss items flosting in spsce. As soon ss the bullet exits the muzzle of the weapon, grsvity begins to pull it down, requiring the sniper to use his elevstion sdjustment. At extended ranges, the sniper sctually aims ths muzzle of his rifle sbove his line of sight snd lets grsvity pull the bullet down into the target. Grsvity is always present, snd the sniper must compensate for this through slsvation sdjustments or holdover techniques.

o Drag. Drsg is the slowing effect the atmosphere has nn the bullet. This effect eithsr increases or decreases, according to the sir--that is, the lass dense the sir, the lesa drsg snd vice versa. Factors sffecting drsg snd sir density sre: temperature, sltitude/ barometric pressure, humidity, bullet efficisncy, and the wind.

o Tempersture. The higher the tempersture, the lass denaa the air. If the sniper zaroea st 60 degrees F and he fires at 80 degreas F, the sir is leaa dense, thereby cauaing an increase in muzzle velocity snd higher impact. A 20-degree chsnge equals s one-minute elavation change oe tha rifle.

o Altitude/barometric praaaure. Since the air preaaure is less at highar altitutdea, tha air ia leaa dense. Thua, the bullet ia more efficient snd impecta higher due to leaa drag. Table 3-1 shows tha eppropriste effact of change of impsct from aea level to 10,000 faat if the rifle ia zeroed st sea level. Impact will be the poiet of sim at aea level. For example, a rifle zeroed et aea level snd firad at 700 metera at 5,000 feet will hit 1.6 minutes high.

o Humidity. Humidity variea slong with the sltitude end tempereture. Table 3-1 considers the chaeges in eltitudes.

Problems can occur if extreme humidity changes exist in the area of operations. That is, when humidity goes up, impact goes down; when humidity goes down, impact goes up. Since impact is affected by humidity, a 20 percent change in humidity equals about one minute as a rule of thumb. Keeping a good data book during training and acquiring experience are the best teachers.

o Bullet efficiency. This is called a bullet's ballistic coefficient. The imaginary perfect bullet is rated as being 1.00. Match bullets range from .500 to about .600. The M118 173-grain match bullet is rated at .515.

o Wind. Wind is discussed in Chapter 3-13.

RANGE (METERS)	2,500 FEET *(ASL)	5,000 FEET (ASL)	10,000 FEET (ASL)
100	.05	.08	.13
200	.1	.2	.34
300	.2	.4	.6
400	.4	.5	.9
500	.5	.9	1.4
600	.6	1.0	1.8
700	1.0	1.8	2.4
800	1.3	1.9	3.3
900	1.8	2.8	4.8
1,000	1.8	3.7	6.0

*Above sea level

Table 3-1. Point of impact rise at new elevation (minutes)

Selected Ballistic Information

Ammunition	Bullet Type	Ballistic Coefficient	Muzzle Velocity
M193	55 FMJBT	.280	3200 FPS
M80	147 FMJBT	.400	2808 FPS
M118	173 FMJBT	.515	2610 FPS
M852	168 HPBT	.475	2675 FPS
M72	173 FMJBT	.515	2640 FPS

3-11. SNIPER DATA BOOK

The aniper dats book cootaina a collection of datn carda. The aniper uaes the data cards to record firing reaulta end all alemeots that had an effeet on firing the waapon. Thia can vary from information about weather conditiona to the attitude of the firer on that pertıcular day. The anlper can refar to this information later to underatand hia weapon, the waather effects, and hia ahooting ability on a given day. One of the moat important itams of ioformation he wlll record la the cold barrel zaro of hia weapon. A eold barrel zero refers to the firat round fired from the weapon at a givan range. It ia critical that the aniper know thia by ahooting the firat round at differant rangaa. For axample, Monday, 400 metera; Tueaday, 500 metara; Wedneaday, 600 metera. When tha barrel warms up, later ahota bagin to group one or two minutea higher or lower, depending on apecific rifla characteriatica. Information ia recorded on DA Form 5785-R (Sniper'a Data Card) (Figure 3-11-1). A blank copy of thia form ia located in appendix N for local reproduction.

When uaad properly, tha data ahaet will provide the necesaary information for initial aight aattinga at aach diatanee or range. It alao provides a baaia for analyzing tha performanca of tha aniper and hia rifle and ia a valueble aid in making bold and acourata aight changaa. Tba moat competent aniper would not bo able to conaiatently hit the center of the target if he were unable to anslyze his performance or if ha had no record of his performance or conditiona affecting his shooting.

Entries

Tha thrae phaaaa in writing information on tha data card are: bafora firing, during firing, and eftar firing.

Before Firing. Information thet ia written bafora firing is:

- Ranga. The distance to the target.
- Rifle and telaacope number. The aerial numbars of the rifla and telaacope.
- Date. Date of firing.
- Ammunition. Type and lot number of ammunition.
- Light. Amount of light (overcaat, clear, and ao forth).
- Mirage. Whether a mirage can ba aeen or not (good, bad, fair, and ao forth).
- Temperature. Temperature on the range.
- Hour. Time of firing

- Light (diagram). Draw an arrow in the direction the light is shining.

- Wind. Draw an arrow in the direction that the wind is blowing, and record its average velocity and cardinal direction (N, NE, S, SW, and so forth).

During Firing. Information that is written while firing is:

- Elevation. Elevation setting used and any correction needed. For example: The target distance is 600 meters; the sniper sets the elevation dial to 6. The sniper fires and the round hits the target 6 inches low of center. He then adds one minute (one click) of elevation (+1).

- Windage. Windage setting used and any correction needed. For example: The sniper fires at a 600 meter target with a windage setting on 0; the round impacts 15 inches right of center. He will then add 2 1/2 minutes left to the windage dial (L/2 1/2). When firing the M21, the sniper draws the windage holdoff on the silhouette in the "HOLD" box.

- Shot. The column of information about a particular shot. For example: Column 1 is for the first round; column 10 is for the tenth round.

- Elevation. Elevation used (ex. 6+1, 6-1).

- Wind. Windage used (ex. L/2, 1/2, O, R/1/2).

- Call. Where the aiming point was when the weapon fired.

- Large silhouette. Used to record the exact impact of the round on the target. This is recorded by writing the shot's number on the large silhouette in the same place it hit the target.

After Firing. After firing, the sniper writes any comments about the firing in the remarks section:

- Comments about the weapon, firing conditions (time allowed for fire), or his condition (nervous, felt bad, felt good, and so forth).

- Corrected no-wind zero: Show the elevation and windage in minutes and clicks that was correct for this position and distance under no-wind conditions.

- Remarks: Note any equipment, performance, weather conditions, or range conditions that had a good or bad affect on the firing results.

Analysis

When the sniper leaves the firing line, he compares weather conditions to the information needed to hit the point of aim/point of impact. Since he fires in all types of weather conditions, he must be aware of temperature, light, mirage, and wind. The sniper must consider other possibilities:

- Compare sight settings with previous firing sessions. If the sniper always has to fine-tune for windage or elevation, there is a chance he needs a sight change (slip a scale).

- Compare the ammunition by lot number for the best rifle and ammunition combination.

Compare all groups fired under each condition. Check the low and high shots as well as those to the left and the right of the main group. Of course, less dispersion is desired. If groups are tight, they are easily moved to the center of the target; if scattered, there is a problem. Check the telescope focus and ensure that the rifle is cleaned correctly. Remarks in the data book will also help.

Make corrections. Record corrections in the data book, such as position and sight adjustment information to ensure retention. The sniper should compare hits to calls. If they agree, this is an indication that the zero is correct and that any compensation for the effects of the weather is correct. If the calls and hits are consistently out of the target, sight adjustment or more position and trigger control work is necessary.

He should compare the weather conditions and location of the groups on the latest data sheet to previous data sheets to determine how much and in which direction the sights should be moved to compensate for the weather conditions. If better results are obtained with a different sight picture under an unusual light condition, the firer should use this sight picture whenever firing under that particular light condition. A different sight picture may necessitate adjusting the sights. After establishing how much to compensate for the effects of weather or which sight picture works best under various light conditions, the firer should commit this information to memory.

The firing data sheets used for training or zeroing should be kept for future reference. Rather than carrying the firing data sheets during sniper training exercises or combat, the firer can carry or tape on his weapon stock a list of the elevation and windage zeros at various ranges.

3-12. ZEROING THE RIFLE

Depending upon the situation, a sniper may be called upon to deliver an effective shot at ranges up to 1,000 meters or more.

This requires the sniper to zero his rifle (with telescopic and iron sights) at most of the ranges that he may be expected to fire. When using telescopic sights, he need only zero for elevation at 300 meters (100 meters for windage) and confirm at the more distance ranges. His success depends on a "one round, one hit" philosophy. He may not get a second shot. Therefore, he must accurately zero his rifle so that when applying the fundamentals he can be assured of an accurate hit.
A zero is the alignment of the sights with the bore of the rifle so that the bullet will impact on the target at the desired point of aim. However, the aiming point, the sight, and the bore will coincide at two points. These points are called the zero.

Characteristics of the Sniper Rifle Iron Sights

The iron sights of the M24 and the M21 are adjustable for both windage and elevation. While these iron sights are a backup to the telescope, and are used operationally only under extraordinary circumstances, it is in the sniper's best interest to be fully capable with them. Iron sights are excellent for developing marksmanship skills. They force the sniper to concentrate on sight alignment, sight picture, and follow-through. The sights on the M24 and the M21 differ in details, but share many similar operating procedures.

M24

The M24 has a hooded front sight that has interchangeable inserts. These inserts range from circular discs to posts, each in varying sizes. It is recommended that the sniper use the post front sight to develop the sight picture that is consistant with the majority of US systems. The rear sight is the Palma match sight and has elevation and windage adjustments in 1/4 MOA. The elevation knob is on the top of the sight, and the windage knob is on the right side of the sight. Turning the elevation knob in the dirction marked "UP" raises the point of impact (POI) and turning the windage knob in the direction marked "R" moves the POI to the right.

M21

The rear sight of the M21 rifle is correctable for both windage and elevation. The windage knob is located on the right of the rear sight mechanism; the elevation knob is on the left. The rear sight also consists of a National Match sight base and a National Match hooded aperture. Each click of the elevation knob on the M21 is worth one MOA and moves the strike of the bullet approximately 1 inch on the target for every 100 meters of range. As the M21 is equipped with a hooded rear-sight aperture, it has a one-half minute elevation change capability. To move the strike of the bullet up one-half minute, the hood must be rotated so that the notch in the hood is up. If the notch in the hood is already up and a one-half minute increase in elevation is desired, the elevation knob must be moved up one click and the hood roteted so that the notch is down. For moving the sights downward, the same

procedure is used, but in reverse. The windage knob produces one-half minute change in windage for each click. Thus, the M21 sniper rifle is capable of one-half minute changes in both elevation and windage. The rear sight can be adjusted from 0 to 72 clicks in elevation and 32 clicks to the right and 32 clicks to the left of the center line of the windage gauge.

Adjustment of the Rear Sight

Mechanical windage zero is determined by aligning the sight base index line with the center line of the windage gauge. The location of the movable index line indicates the windage used or the windage zero of the rifle; for example, if the index line is to the left of the center line of the gauge, this is a left reading; windage zero can be determined by simply counting the number of clicks back to the mechanical zero.

The elevation of any range is determined by counting the number of clicks down to mechanical elevation zero (hooded aperture down for the M21).

Sight adjustment or manipulation is a very important aspect of training that must be thoroughly learned by the sniper. This can best be accomplished through explanation and practical work in the manipulation of the sights.

The rear sight must be moved in the direction that the shot or shot group is to be moved. To move the rear sight or a shot group to the right, the windage knob is turned clockwise. The rule to remember is: "Push right--pull left." To raise the elevation or a shot group, the elevation knob is turned clockwise. To lower the elevation or a shot, the elevation knob is turned counterclockwise.

Zeroing the Sniper Rifle Using the Iron Sights

The most precise method of zeroing a sniper rifle with the iron sights is to fire the rifle and adjust the sights to hit a given point at a specific range. The rifle is zeroed in 100-meter increments from 100 to 900 meters. The targets are placed at each range; then the sniper fires one or more three-round shot groups at each aiming point, adjusting the rear sight until the center of the shot group and the aiming point coincide at each range. The initial zeroing for each range should be accomplished from the prone supported position. The sniper can then zero from those positions and ranges that are most practical. There is no need to zero from the least steady positions at longer ranges.

Zeroing procedure for iron sights:

o Center the front sight on the sight block (M21 only). There is an allen screw at the rear of the front sight. Loosen it and slide the front sight on the block until it is centered. Retighten the allen screw. For the M24, ensure that the front and

rear aighte are anugly sttached to the correct dovetaila on the SWS.

o Center the rear aight by aligning the aight base index liea snd the center line for windage guage. For the M21: rotate the windage knob in one direction until it atope, then backing off 32 clicka. The index line snd wiedage guage ahould be aligned. Thia indicatea the mechanicsl windage zero.

o Fire a three-round ahot group. Use a aolid prone aupported poaitioe. Note the position of the ahot group on the target, but do not make any corrections. Stand up snd wait 1 minute, then saaume the aame position and fire another ahot group. By firing two separate groupa, the aeiper geta a much more accurate indication of errora due to the sight being out of alignment snd can prevent errora due to a poor ahooting poaition.

o Note the poaition of the two ahot groupa in relation to the point of aim. Detarmina the amount of error and sdjust the rear aight for windage and elavstion until the canter of tha ahot group end aiming point coincida at each rsnga.

o Datermina the alavation zero for each range by counting tha number of clicka down to the mechanicsl alavation zaro (hoodad eparture indax notch down).

o Tha locetion of the movsbla indax line indioataa tha windage uaad or the windaga zaro of the rifla. Detarmina tha windaga zero by oounting tha number of clicks back to the machanical zaro.

M24 Iron Sight Details

Elevation knob adjuatmants: By turning tha alavetion knob locatad on the top of the reer aight in the "UP" diraction reisas the point of impact; turoing the knob in the oppoaite diraction lowera the point of impact. Each click of adjuatment equals .25 MOA.

Windage knob sdjuatmenta: By turning the windage keob located on the right aide of the raar sight in the "R" direction to moves the impact of the roued to the right; turning the knob in the opposite direction moves tha point of impact to the left. Each click of adjustment equals .25 MOA.

Calibrsting rear sight: After zeroing the sighta to the rifle, looaen the elevation snd windage indicator plate acrewa with the wrench provided. Align the "0" oe the plate with the "0" on the aight body, then retighten the plate acrewa. Next, looaen the eet acrews in each knob aed align the "0" of the knob with the refereece line oe tha sight. Preaa the aight snd tighten the aet acrews. Sharpen or aoften the click to preference by loosening or tightening the epring screws aqually oe the knob. Now, windage snd

elevation corrections can be made and the sniper can return quickly to the "zero" standard.

Graduations: There are 12 divisions or 3 MOA adjustments in each knob revolution. Total elevation adjustment is 60 MOA and total windage adjustment is 36 MOA. Adjustment scales are of the "vernier" type. Each graduation on the scale plate equals 3 MOA. Each graduation on the sight base scale equals 1 MOA.

To use the scales, the sniper:

o Notes the point at which graduations on both scales are aligned (Figure 3-12-1).

o Counts the number of full 3 MOA graduations from "0" on the scale plate to "0" on the sight base scale.

o Adds this figure to the number of MOAs from "0" on the bottom scale to the point where the two gradustions are aligned.

Calibrating the M21 Iron Sight

The index lines on the elevation knob designate hundreds of meters or yards to the target. The elevation knob that is calibrated for meters (most common) has a "M" stamped into its body. The elevation knob that is calibrated in yards does not have the "M" stamped on its body. Every other line is numbered with an even number, lines in between are the odd hundreds of meters. For example, the line marked with a number "2" is the 200m index line. The index line between the numbers 2 and 4 is the 300m index line. If the distance to the target is not in exact hundreds of meters, the elevation knob should be clicked between the index lines to approximate the distance. If the target distance is less than 100m, the 100m setting should be used; the difference in impact is minimal.

To calibrate the elevation knob, the sniper must first zero the rifle at a known distance that correlates to one of the index lines on the elevation knob. (The recommended distance is 300m).

Once zeroing is completed, calibration involves the following steps:

Step 1: Turn the elevation knob forward (down, away from the sniper), and move the rear sight aperture assembly to its lowest setting (mechanical zero), counting the number of clicks. This number of clicks is elevation zero and must be remembered for use in the calibration process. For example, the number will be 10 clicks.

Step 2: Loosen the screw in the center of the elevation knob using a dime or screwdriver (about one turn) until the knob can be rotated forward. Be careful not to loosen the screw too

much or it may fall and become lost. It is critical that once the screw is loosened to never rotate the elevation knob clockwise (up or toward the sniper) during calibration. This could result in improper calibration.

Step 3: Turn the elevation knob forward (down, away from the sniper) until the index line on the receiver lines up with the index line on the knob that corresponds to the distance at which the rifle was zeroed--for example, 300 yards. This is the index line between 2 and 4. If the setting is passed (even by one click), rotate the elevation knob counterclockwise (down, away from the sniper) until the index lines match up. Never rotate the knob in the UP direction (clockwise, toward the sniper) with the screw in the elevation knob loose.

Step 4: Remember the number of clicks (for example, 10) when zeroing the rifle and begin rotating the elevation knob counterclockwise (down, away from the sniper). Count the clicks until the elevation knob has been rotated the same number of clicks that were on the rifle when zeroed. If too many clicks are used, start over at Step 3.

Step 5: Now, hold the elevation knob, being careful not to allow it to rotate, then tighten the screw in the center of the elevation knob as tight as possible. Hold the elevation knob carefully with a pair of pliers to ensure the screw is tight.

Step 6: To check the calibration, rotate the elevation knob to mechanical zero (all the way down), then count the number of clicks to zero. This should result in the index line on the receiver being lined up with the correct index line on the elevation knob (between 2 and 4). If this happens, the rear sight is now calibrated for elevation. If not, repeat Steps 1 through 5.

Characteristics of the Sniper Rifle Telescopic Sight

Sniper telescopic sights have turret assemblies for the adjustment of elevation and windage. The upper assembly is the elevation, and the assembly on the right is for windage. These assemblies have knobs that are marked for corrections of a given value in the direction indicated by the arrow. The M3A and the ART series use a similar system for zeroing. The sniper moves the knobs in the direction that he wants the shot group to move on the target. See Appendix I for details on the telescopic sights.

M3A

The M3A is graduated to provide 1 MOA of adjustment for each click of its elevation knob, and 1/2 MOA of adjustment for each click of its windage knob. This sight is designed to provide audible and tactile clicks. The elevation turret knob is marked in meters, in 50-meter increments from 100-1000m.

ART I/II

The ART series is graduated to provide 1/2 MOA adjustments for both elevation and windage adjusting screws. These adjustment screws are marked with painted index lines, and are friction only. The sniper must observe the screws while he is making adjustments. The scale on each turret of the ART I and ART II has 48 index lines, each representing a half-minute of movement. At 100 meters, one revolution of the adjusting screw equals 48 half-minutes (48 half-inches) or 24 full minutes (24 inches).

Zeroing the Sniper Weapon System With the Telescopic Sight

The most precise method of zeroing the sniper rifle for elevation using the scope sight is to fire and adjust the sight to hit a given point at 300 meters. For windage, the scope should be zeroed at 100 meters. This rules out as much wind effect as possible. After zeroing at 100 meters, the sniper should confirm his zero out to 900 meters in 100-meter increments. The bullseye-type target (200 yard targets, NSN SR1-6920-00-900-8204) should be used for zeroing.

The sniper should use the following zeroing procedure:

- Properly mount the scope to the rifle.
- Select or prepare a distinct target (aiming cross) at 300 meters for elevation or 100 meters for windage.
- Assume the supported prone position.
- Loosen the power ring lock on the ART scopes by turning the knurled nut counterclockwise.
- Turn the power adjustment ring to the low power/range setting (3 index) on the ART scopes. The M3A is a fixed 10 power scope. Set elevation to the range at which you are presently zeroing.
- While aiming, superimpose the cross hair over the aiming cross and position the 30-inch target between the vertical stadia marks on the ART I. These are not present on the ART II or the M3A.
- Fire a three-round shot group and determine its location and distance from the aiming cross.
- Using the elevation and windage rule, determine the number of clicks (half-minutes of elevation and windage for the ART I and ART II, full minute of elevation for the M3A1) necessary to move the center of the group to the center of the aiming cross.
- Remove the elevation and windage turret caps and make the necessary sight adjustments. Then replace the turret caps. In

making sight adjustments, remember to turn the adjusting screws in the direction that you wish to move the strike of the bullet or group. With the ART I and ART II always go past the intended setting, then return to the setting. Finally, tap the turret to get it to settle.

- Fire additional groups as necessary to ensure that the center of the shot group coincides with the point of aim at 300 meters.

- Zero the elevation and windage screws and replace the turret caps.

- The rifle is now zeroed for 300 meters.

- To engage targets at other ranges, you need only set the desired range (300 to 900 meters, inscribed on the focusing ring for the ART I or ART II) opposite the reference dot on the top of the scope. For the M3A set the range on the elevation turret. To engage targets at undetermined ranges, range on the target, and in conjunction with ranging, for the ART I and ART II, the ballistic cam will elevate the scope to compensate for trajectory. The M3A must be manually set on the elevation turret after ranging using the mil dots in the scope.

NOTE: The elevation and windage adjusting screws should not be moved beyond the point where reticle movement stops. The mechanism may become disengaged and require factory repair.

Adjustable Ranging Telescope (ART I and ART II)

All rifle telescopic sights, regardless of stated instructions, should be placed on 3 power (for ART scopes) and zeroed for windage at 100 meters. This will negate a majority of wind errors and will produce, as closely as possible, a no-wind zero. Once the windage is set on the windage adjustment, it must be zeroed and marked. Elevation for all scopes should be zeroed at 300 meters. Even though the ART II states that the weapon can be zeroed at 100 meters, this is undesirable due to elevation cam wear, elevation cam post wear, and/or improper height adjustment. Even though the ART scopes should "automatically" adjust for ranges once they have been zeroed, the shooter must shoot each 100-meter increment to confirm auto ranging. If a discrepancy exists, the shooter must record this discrepancy in his shooter's log. This is important due to cam wear variances that cause the scope to improperly elevate as the shooter turns the cam. Some ART IIs possess a 100-1000m cam. After zeroing at 300 meters, the shooter must check his zero at 100 and 200 meters as marked on the cam. This is important, as the cam post height adjustment may very well be too low to permit this adjustment. The key to the ART scope system is to remember scope age and wear on the cams. This almost always

produces a discrepancy in the auto range system for elevation zero at all the ranges. This does not affect the ability of the scope to range on a target. The 150-450m cam for the ART II suffers the same problems.

Due to the ART scope mounting system and the ART scope ranging cam several items must be checked to maintain consistent grouping. First, the shooter must hand tighten the mounting screws for the ART I and ART II as tight as possible. He should then fire five rounds and retighten the scope. At this time he should mark the knurled knobs and mount to give visual reference to the tightening point. Then after every 5 to 10 rounds of firing, he should visually and manually check for mount tightness. Both scope mounts have a tendancy to work loose during firing.

The ART II power ring and range cam can be seperated so that the firer can utilize 9x at 300 meters or any other power and range combination. However, this procedure should be used with extreme caution and only in circumstances when only one shot is to be fired. When the power ring and the range cam on the ART II are separated, the power ring remains tight and will hold its position, but the range cam will not. The range cam will float after each shot, changing the elevation. If more than one shot is necessary, the range cam must be checked after each shot. If the power ring and range cam are separated and are not fired for a period of time, the range cam must be checked before the weapon is fired.

AN/PVS-2 Night Vision Device

The AN/PVS-2 may be zeroed during daylight hours or during hours of darkness. However, the operator may experience some difficulty in attempting to zero just before darkness (dusk). The light level is too low at dusk to permit the operator to resolve his zero target with the lens cap cover in place, but the light level at dusk is still intense enough to cause the sight to automatically cut off unless the lens cap cover is in position over the objective lens. The sniper will normally zero the sight for the maximum practical range that he can be expected to observe and fire, depending on the level of illumination.

The sight is zeroed in the following manner:

o Place or select a distinct target at the desired zeroing range. A steel target provides the easiest target to spot because bullet splash is indicated by a spark as the bullet strikes the steel. Assume the prone supported position, supporting the weapon and night vision sight combination with sandbags or other available equipment that will afford maximum stability.

o Bore sight the sight to the rifle. To do this, place the iron sight windage and elevation zero on the rifle for the zeroing range and adjust the weapon position until the correct sight picture is obtained on the aiming point at the zeroing range. Move

the eye to the night vision sight and observe the location of the reticle pattern in relation to the reference aiming point. If the reference aiming point on the target and the reference point of aim of the reticle pattern do not coincide, move the elevetion and azimuth adjustment knobs until these aiming points coincide.

o Place the reference point of aim of the reticle pattern (Figure 3-12-2) on the center of mass of the target, or on a distinct aiming point on the target, and fire enough rounds to obtain a good shot group. Check the target to determine the center of the shot group in relation to the reticle point of aim.

o Adjust the night vision sight to move the reticle aiming reference point to the center of the shot group. When making adjustments for errors in elevation or azimuth, move the sight in the direction of the error. For example, if the shot group is high and to the left of the reticle point of aim, compensate for the error by moving the sight to the left and up.

NOTE: Each click of the azimuth or elevation knob will move the strike of the round 2 inches for each 100 meters of range.

To engage targets at ranges other than the zero range, apply hold-off to compensate for the rise and fall in the trajectory of the round.

AN/PVS-4 Night Vision Device

Zeroing the AN/PVS-4 is similar to zeroing with standard optical sights because (unlike the AN/PVS-2) the AN/PVS-4 mounts over the bore of the weapons system and has internal windage and elevation adjustments (Figure 3-12-3).

Factors Affecting or Influencing the SWS Zero

The effects of the weather are the primary causes of error in the strike of the bullet and factors affecting zero. The wind, mirage, light, temperature, and humidity all heve an effect on the bullet, the sniper, or both. Sniping is often accomplished under extremes of weather, therefore, all effects must be considered. Wind conditions constantly present the greatest problem to the sniper. The wind has considerable affect on the bullet that increases with the range. Winds also have considerable effect on the shooter. The stronger the wind, the more difficulty the shooter hes in holding the rifle steady. Light affects the shooter in different ways. This subject is very controversial as light may or may not have an affect.

Periodic Checking

A sniper cannot expect his zero to remain absolutely constant. Periodic checking of the zero is required after disassembly of the sniper rifle for maintenance and cleaning, for changes in ammunition lots, as a result of severe weather changes, and to

ensure sccuracy of fire to obtain first-ahot hita. The rifle must be zeroed by the individual who will uae it. Individual differancea in stock or apot weld, eye rslief, poaition, snd trigger control usually reault in each aniper having a different zero with the ssme rifle or s change in zero sfter moving from one position to snother.

Confirming Zero

After s rifle haa been zeroed and it becomea necessary to confirm thia zero for sny resson, the rifle csn be zeroed again by firing st a known distsnce with the aight set on the old zaro If s sight sdjustaent is nacaasary to hit the aiming point, this zero change will remain conatsnt st all raagaa. For example, if firing st s distance of 500 matera with the old zero and it becomes necesssry to rsise the elevation three clicka to hit the aiming point, the elevstion zaro ahould be raised three clicka at sll ranges.

Changing Zero

Before changing ths zsro, windags, or elevstion, the snipsr must conaidar the effects of westhsr. A aniper rifle csn chengs ths zero bscsuas of wear, abuss, or repsars, Extrsme chsngss of humidity or tampsratura csn wsrp the stock or affect the smmunition.

Field Expedient Zeroing

Ths eniper may nsed to confirm his zsro in s fisld environmsnt. A weapon that has besn dropped or tsksn through exoassive climatic chsngss ee may be experiencsd by deploying world-wide srs good rsssons for confirming ths SWS's zsro. This method msy slso bs ussd when tha time or ths situstion does not permit the uss of s known distance range. This tschniqus is best uaad for oonfirming old zeros.

The eniper will need an observer equipped with binoculars or a spotting taleacope to assist him. Tha sniper and observer pick out sn siming point in tha center of an ares--hillside, brick house, or any surface where the strike of the bullet can be observad. The rsnge to thia point can be determined by the rsnging davice on the telescope, map survey, by the range csrd of another wespon, or by ground messursment.

Onca the firer hss aaaumed a atable position, the observer must poaition himaelf to the rear of the firer snd cloae to him. The obaerver'a binoculara or talescope ahould be positioned approximately 18 to 24 iaches above the weapon and directly in line with ths axia of the bore. With hia optics in this poaition, the observar can see the trsce of the bullet as it movea downrange. The trace or shock wsve of the bullat aets up sn air turbulence sufficient snough to be observed in the form of a vspor trail. The trsce of the bullet ensbles the obeerver to follow the path of the bullet in ita trajectory towards ita impact area. The trsce will

disappear prior to impact, making it appear to the inexperienced observer that the bullet struck above or beyond its actual impact point. For example, at 300 meters the trace will disappear approximately 5 inches above the impact point. At 500 meters the trace will disappear approximately 25 inches above the impact point.

Wind causes lateral movement of the bullet. This lateral movement will appear as a drifting of the trace in the direction that the wind is blowing. This movement must be considered when determining windage zero. The observer must be careful to observe the trace at its head and not be misled by the bending tail of the trace in a stout crosswind. Before firing the first round, the sniper must set his sights so that he will hit on or near his aiming point. This sight setting is based on the old zero or an estimate. The sniper fires a shot and gives a call to the observer. If the strike of the bullet could not be observed, the observer gives a sight adjustment based on the trace of the bullet.

If the first shots do not hit the target, the shooter may fire at the four corners of the target. One of the rounds will hit the target, and the shooter can use this bit to make an adjustment to start the zeroing process. Once the strike of the bullet can be observed in the desired impact area, the observer compares the strike with the call and gives sight adjustments until the bullet impact coincides with the aiming point.

Firing at Targets for which No Definite Zero has been Established

When firing on targets at a range of 100 meters or less, the 100-meter zero should be used. The difference between the impact of the bullet and the aiming point increases as the range increases if the sights are not moved. If the sniper's zero is 46 clicks at 900 meters and 40 clicks at 800 meters and if he establishes the range of the target at 850 meters, he should use a sight setting of 43 clicks rather than using his 800- or 900-meter zero or the hold-off method. At any range, moving the sights is preferred over the hold-off method.

Firing the 25-Meter Range

Dial the telescope to 300 meters for elevation and to zero for windage. Aim and fire at a target that is at a 25-yard distance. Adjust the telescope until rounds are impacting one (1.0) inch above the point of aim. To confirm, fire the SWS on a KD range out to its maximum effective range.

For iron sights, the sniper may fire on a 25-meter range to obtain a battle-sight zero. The sniper then subtracts one minute (one click) of elevation from the battle-sight zero to get a 200-meter zero. The sniper may then use the following table to determine the necessary increases in elevation to engage targets out to 600 meters:

200 to 300 meters--two minutes.

300 to 400 meters--three minutes.

400 to 500 meters--four minutes.

500 to 600 meters--five minutes.

NOTE: This table is based on the average change of several sniper rifles, and while the changes may not result in an "exact" point of aim, or point of impact zero, the sniper should not miss his target.

3-13. ENVIRONMENTAL EFFECTS

For the highly trained sniper, the effects of weather are the main cause of error in the strike of the bullet. Wind, mirage, light, temperature, and humidity all have some effect on the bullet, the sniper, or both. Some effects are insignificant, depending on average conditions of sniper employment. However, sniping is often accomplished under extremes of weather; therefore, all effects must be considered.

Wind Classification

The condition that constantly presents the greatest problem to the sniper is the wind. The wind has a considerable effect on the bullet, and the effect increases with the range. This is due mainly to the slowing of the bullet's velocity combined with a longer flight time. This allows the wind to have a greater effect on the bullet as distances increase. The result is a loss of stability. Wind also has a considerable effect on the sniper. The stronger the wind, the more difficulty the sniper has in holding the rifle steady. The effect on the sniper can be partially offset with good training, conditioning, and the use of supported positions.

Since the sniper must know how much effect the wind will have on the bullet, he must be able to classify the wind. The best method is to use the clock system (Figure 3-13-1). With the sniper at the center of the clock and the target at 12 o'clock, the wind is assigned three values: full, half, and no value. Full value means that the force of the wind will have a full effect on the flight of the bullet. These winds come from 3 and 9 o'clock. Half value means that a wind at the same speed, but from 1,2,4,5,7,8,10, and 11 o'clock, will move the bullet only half as much as a full-value wind. No value means that a wind from 6 or 12 o'clock will have little or no effect on the flight of the bullet at close ranges. The no-value wind has a definite effect on the bullet at long ranges (beyond 600 meters) if it is not blowing directly from 6 or 12 o'clock. This is the most difficult wind to fire in due to

its switching or fishtail effect, which requires frequent sight changes. Depending on the velocity of this type of wind, it may have a slight effect on the vertical displacement of the bullet.

Wind Velocity

Before adjusting the sight to compensate for wind, the sniper must determine wind direction and velocity. He may use certain indicators to accomplish this. These are range flags, smoke, trees, grass, rain, and the sense of feel. However, the preferred method of determining wind direction and velocity is reading mirage. In most cases, wind direction can be determined simply by observing the indicators.

A common method of estimating the velocity of the wind during training is to watch the range flag (Figure 3-13-2). The sniper determines the angle between the flag and pole, in degrees, then divides by the constant number 4. The result gives the approximate velocity in miles per hour. This is based on the use of the heavier cotton range flags, not nylon flags, which are now used on most ranges.

If no flag is available, the sniper holds a piece of paper, grass, cotton, or some other light material at shoulder level, then drops it. He then points directly at the spot where it lands and divides the angle between his body and arm by the constant number 4. This gives him the approximate wind velocity in miles per hour (Figure 3-13-3).

If these methods cannot be used, the following information is helpful in determining velocity:

Wind Velocity (mph)	Effect
0 - 3	The wind can barely be felt, but may be detected by mirage or smoke drifts.
3 - 5	The wind can be felt on the face.
5 - 9	The leaves in the trees and long grass are in constant motion.
9 - 14	The wind raises dust, loose paper and moves small branches in trees.
14 - 20	The wind causes small trees to sway.
20 - 26	There is a strong breeze and the large branches in the trees are in motion.

Mirage

A mirage is a reflection of the heat through layers of air at different temperatures and densities as seen on a warm, bright day. With the telescope, the sniper can see a mirage as long as there is

a difference in ground and air temperatures. Proper reading of the mirage enables the sniper to estimate wind speed and direction with a high degree of accuracy. The sniper uses the M49 spotting scope to read the mirage. Since the wind nearest to mid-range has the greatest effect on the bullet, he tries to determine velocity at that point. He can do this in one of two ways:

o He focuses on an object at midrange, then places the telescope back on to the target without readjusting the focus.

o He can also focus on the target, then back off the focus one-quarter turn counterclockwise. This makes the target appear fuzzy, but the mirage will be clear.

As observed through the telescope, the mirage appears to move with the same velocity as the wind, except when blowing straight into or away from the telescope. Then, the mirage gives the appearance of moving straight upward with no lateral movement. This is called a boiling mirage. A boiling mirage may also be seen when the wind is constantly changing direction. For example, a full-value wind blowing from 9 o'clock to 3 o'clock suddenly changes direction. The mirage will appear to stop moving from left to right and will present a boiling appearance. When this occurs, the inexperienced observer may direct the sniper to fire with the "0" wind. As the sniper fires, the wind begins blowing from 3 o'clock to 9 o'clock, causing the bullet to miss the target; therefore, firing in a "boil" can hamper shot placement. Unless there is a no-value wind, the sniper must wait until the boil disappears. In general, changes in the velocity of the wind, up to about 12 miles per hour, can be readily determined by observing the mirage (Figure 3-13-4). Beyond that speed, the movement of the mirage is too fast for detection of minor changes. In general, when the waves of the mirage are shallow, its velocity and resultant wind speed are fast.

The true direction of the wind may be determined by traversing the telescope until the heat waves appear to move straight up with no lateral motion (a boiling mirage).

A mirage is particularly valuable in reading no-value winds. If the mirage is boiling, the effective wind velocity is zero. If there is any lateral movement of the mirage at ranges of 300 to 900 meters, it is usually necessary to make windage adjustments.

Another important effect of mirage is the light diffraction caused by the uneven air densities, which are characteristic of heat waves. Depending on atmospheric conditions, this diffraction will cause a displacement of the target image in the direction of the movement of the mirage. Thus if a mirage is moving from left to right, the target will appear to be slightly to the right of its actual location. Since the sniper can only aim at the image received by his eye, he will actually aim at a point which is

offset slightly from the center of the target. This error will be in addition to the displacement of the bullet caused by the wind. Since the total effect of the visible mirage (effective wind plus target displacement) will vary considerably with atmospheric conditions and light intensity, it is impossible to predict the amount of error produced at any given place and time. It is only through considerable experience in reading images that the sniper will develop proficiency as a "wind doper."

Before firing, the sniper should check the mirage and make the necessary sight adjustments or holdoff to compensate for any wind. Immediately after firing and before plotting the call in the scorebook, he again checks the mirage. If any changes are noted, they must be considered in relating the strike of the bullet to the call. The above procedure should be used for each shot.

Conversion of Wind Velocity to Minutes of Angle

All telescopic sights have windage adjustments that are graduated in minutes of angle or fractions thereof. A minute of angle is 1/60th of a degree. This equals about 1 inch (1.0472 inches) for every 100 meters.

Example: 1 MOA = 2 inches at 200 meters
1 MOA = 5 inches at 500 meters

Snipers use minutes of angle to determine and adjust the elevation and windage needed on the telescope. After finding the wind direction and velocity in miles per hour, the sniper must then convert it into minutes of angle, using the wind formula as a rule of thumb only. The wind formula is:

$$\frac{\text{RANGE (hundreds)} \times \text{VELOCITY (mph)}}{\text{CONSTANT}} = \text{Minutes full-value wind}$$

The constant depends on the target's range, and is due to bullet velocity loss:

100 to 500	"C"	= 15
600	"C"	= 14
700 to 800	"C"	= 13
900	"C"	= 12
1000	"C"	= 11

If the target is 700 meters away and the wind velocity is 10 mph, the formula is:

$$\frac{7 \times 10}{13} = 5.38 \text{ minutes or } 5\ 1/2 \text{ minutes}$$

This determines the number of minutes for a full-value wind. For a half-value wind, the 5.38 would be divided in half.

The obaerver makes his own sdjustment estimations, then compsres them to the wind conversion table, which can be s valuable trsining tool. He must not rely on this tsble; if it is lost, bis ability to perform the misaion could be severely hsmpered. Until the obssrver gsins skill in estimatiag wind speed and computing sight chsnges, he may refer to the wind conversion table (Tsble 3-1).

Effects of Ligbt

Light does not affect the trajectory of the bullet; however, it may affect the way the saiper sses the target through the telescope. Light sffects different people in different wsys. The general tsndsncy, however, is for the saiper to shoot high on s dull, cloudy day and low on s bright, clesr dsy. Extreme light conditiona from the left or the rigbt may have an effect on the horizontsl impact of s shot group.

This effact can be compsred to the refraction (banding) of light through a medium, such ss a prism or a fish bowl. The same effect, although not as draatic, can be obsarved on s day with high humidity and with sunlight from high anglas. To solva tha problam of light and its affects, tha aniper must accurately racord tha light conditions undar which he is sbooting. Through axpariancs and atudy, ha will avantually datarmina tha affact of light on his zaro. Light may slso affect firing of unknown distsnca rangas aince it affacts ranga determination capabilitias.

Effects of Temperature

Tamperatura haa s dafinita affact on tha alavation satting raquirad to hit tha cantar of tha targat. This is csusad by tha fact that an incraasa in temperatura of 20 dagraas F will incrasse tha muzzla valocity by spproximately 50 fsat per sacond. Whan ammunition sits in diract sunlight, the burn rata of powder is incrasaad. Tha graatast effact of temperature is on the density of tha sir. As the temperatura rises, the air density is lowered. Sinoe there is less rasistaace, velocity incresses and once again the impact rises. This is in ralation to the tempersture in which the rifla wss seroed. If the sniper zeroes st 50 degrees and he is now firing at 90 dagrsss, the impact risss considersbly. How high it rises is best determined once sgsin by past firing recorded in the data book. The genarsl rule, however, is that s 20-degree incrssse from zero tempersture will rsise the impsct by one minute; conversely, s 20-degree decrease will drop impact by one miaute.

Elevation sbove ses level can have an importsnt effect on bullet trsjsctory. At higber elevations sir density, tempersture, snd sir drag on the bullet dacrease.

Effects of Humidity

Humidity varias slong witb the altitude and tsmpersture. The sniper can sncounter problems if drsstic bumidity chsnges occur in his ares of operation. Remember, if humidity goes up, impact goes

down; if humidity goes down, impact goes up. As a rule of thumb, a 20-percent change will equal about one minute, affecting the impact. The sniper should keep a good data book during training and refer to his own record.

To understand the effects of humidity on the strike of the bullet, the sniper must realize that the higher the humidity, the denser the air; thus there is more resistance to the flight of the bullet. This resistance will tend to slow the bullet, and, as a result, the sniper must raise his elevation to compensate for it. The effect of humidity at short ranges is not as noticeable as at longer ranges. The experience of the sniper and his study of hits and groups under varied conditions of humidity will determine the effect of humidity on his zero.

Some snipers fail to note all of the factors of weather. Certain combinations of weather will have different effects on the bullet. For this reason, a sniper may fire two successive days in the same location and under what appears to be the same conditions and yet use two different sight settings. For example, a 30 percent rise in humidity cannot always be determined readily. This rise in humidity makes the air denser. If this heavier air is present with a 10 miles per hour wind, more elevation and more windage will be required to hit the same location than on a day when the humidity is 30 percent lower.

By not considering all the effects of weather, some snipers may tend to overemphasize certain effects, and this will produce bad shots from time to time. Snipers normally fire for a certain period of time under average conditions. As a result they zero their rifles, and (with the exception of minor displacements of shots and groups) they have little difficulty except for the wind. However, a sniper can travel to a different location and fire again and find a change in his zero. Proper recording and study of the weather effects would indicate why the zero changed. Proper recording and study based on experiences are all-important with respect to determining the effects of weather. Probably one of the most difficult things to impress upon a sniper is the evidence of a probable change in his zero. If a change is indicated, it should be applied to all ranges.

3-14. SLOPE SHOOTING

Most firing practice conducted by the sniper team involves the use of military range facilities, which are relatively flat. However, as a sniper being deployed to other regions of the world, the chance exists of operating in a mountainous or urban environment. This requires target engagements at higher and lower elevations. Unless the sniper takes corrective action, bullet impact will be above the point of aim. How high the bullet hits is

determined by the range and angle to the target (Table 3-3). The amount of elevation changed applied to the telescope of the rifle for angle firing is known as slope dope.

ANGLE:	5	10	15	20	25	30	35	40	45	50	55	60
RANGE (m)												
100	.01	.04	.09	.16	.25	.36	.49	.63	.79	.97	1.2	1.
200	.03	.09	.2	.34	.53	.76	1.	1.3	1.7	2.	2.4	2.
300	.03	.1	.3	.5	.9	1.2	1.6	2.1	2.7	3.2	3.9	4.
400	.05	.19	.43	.76	1.2	1.7	2.3	2.9	3.7	4.5	5.4	6.
500	.06	.26	.57	1.	1.6	2.3	3.	3.9	4.9	6.	7.2	9.
600	.09	.31	.73	1.3	2.	2.9	3.9	5.	6.3	7.7	9.2	10.
700	.1	.4	.9	1.6	2.5	3.6	4.9	6.3	7.9	9.6	11.5	13.
900	.13	.5	1.	2.	3.	4.4	5.9	7.7	9.6	11.7	14.	16.
900	.15	.6	1.3	2.4	3.7	5.3	7.2	9.3	11.6	14.1	16.9	19.
1000	.2	.7	1.6	2.9	4.5	6.4	8.6	11.	13.9	16.9	20.2	23.

NOTE: Range given is slant range (meters), not map distance.

Table 3-3. Bullet rise at given angle and range in minutes

The following is a list of compensation factors to use in setting the sights of the sniper weapon system when firing from any of the following angles. To use this table, find the angle at which you must fire and then multiply the estimated range by the decimal figure shown to the right. For example, if the estimated range is 500 meters and the angle of fire is 35 degrees, set the zero of the weapon for:

500 x .82 = 410 meters.

PERCENT OF SLOPE ANGLE UP OR DOWN	MULTIPLY RANGE BY
05 degrees	.99
10 degrees	.98
15 degrees	.96
20 degrees	.94
25 degrees	.91
30 degrees	.87
35 degrees	.82
40 degrees	.77
45 degrees	.70
50 degrees	.64
55 degrees	.57
60 degrees	.50
65 degrees	.42
70 degrees	.34
75 degrees	.26
80 degrees	.17
85 degrees	.09
90 degrees	.00

As can be seen, the steeper the angle, the shorter the range will be set on the scope or sights for a first-round hit. Also, the steeper the angle, the more precise you must be in estimating or measuring the angle. Interpolation is necessary for angles between tens and fives.

Example: Find the compensation factor for 72 degrees.

70 degrees = .34; 75 degrees = .26

72 is 40 percent between 70 and 75 degrees

.34 - .26 = .08

.08 X 40 % (.40) = .03

.34 - .03 = .31

3-15. HOLDOFF

Holdoff is shifting the point of aim to achieve a desired point of impact. Certain situations, such as multiple targets at varying ranges and rapidly changing winds, do not allow proper windage and elevation adjustments. Therefore, famliarization and practice of elevation and windage holdoff techniques prepare the sniper to meet these situations.

Elevation

This technique is used only when the sniper does not have time to change his sight setting. The sniper rarely achieves pinpoint accuracy when holding off, since a minor error in range determination or a lack of a precise aiming point might cause the bullet to miss the desired point. He uses holdoff with the telescope only if several targets appear at various ranges, and time does not permit adjusting the scope for each target

The sniper uses holdoff to hit a target at ranges other than the range for which the rifle is presently adjusted. When the sniper aims directly at a target at ranges greater than the set range, his bullet will hit below the point of aim. At closer distances, his bullet will hit higher than the point of aim. If the sniper understands this and the effect of trajectory and bullet drop, he will be able to hit the target at ranges other than that for which the rifle was adjusted. For example, the sniper adjusts the rifle for a target located 500 meters downrange, but another target appears at a range of 600 meters. The holdoff would be 25 inches; that is, the sniper should hold off 25 inches above the center of visible mass in order to hit the center of mass of that particular target (Figure 3-15-1). If another target were to appear at 400 meters, the sniper would aim 15 inches below the center of visible mass in order to hit the center of mass.

The vertical mil dots on the M3A's reticle can be used as aiming points when using elevation holdoffs (Figure 3-15-2). For example, if the sniper has to engage a target at 500 meters and the scope is set at 400 meters, he would place the first mil dot 5 inches below the vertical line on the target's center mass. This gives the sniper a 15-inch holdoff at 500 meters.

For a 500-meter zero:

- 100 and 400 meters, the waist/beltline.
- 200 and 300 meters, the groin.
- 500 meters, the chest.
- 600 meters, the top of the head.

Windage

The sniper can use a holdoff to compensate for the effects of wind. When using the M3A scope, the sniper uses the horizontal mil dots on the reticle to hold off for wind. The space between each mil dot equals 3.375 MOA, and a very accurate hold can be determined with the mil dots. For example, if the sniper has a target at 500 meters that requires a 10-inch holdoff, he would place the target's center mass halfway between the cross hair and the first mil dot (1/2 mil) (Figure 3-15-3). When using the horizontal stadia marks on the ART-type scope reticle to measure the required

holdoff distance, the sniper must remember to first range-in on the target. He then subdivides the horizontal reticle line within the stadia marks (60 inches) to determine the correct distance for holdoff (Figure 3-15-4). He can also use that reference point as an aiming point or point of aim.

When holding off, the sniper aims into the wind. If the wind is moving from the right to left, his point of aim is to the right. If the wind is moving from left to right, his point of aim is to the left. Constant practice in wind estimation can bring about proficiency in making sight adjustments or learning to apply holdoff correctly. If the sniper misses the target and the impact of the round is observed, he notes the lateral distance of his error and refires, holding off that distance in the opposite direction.

The formula used to find the holdoff distance is:

$$\frac{\text{Clicks (from wind formula)} \times \text{Range (nearest hundred)}}{2} = \frac{\text{Holdoff}}{\text{(inches)}}$$

Note: The wind formula must be computed first to find the clicks.

Example: Range to a target is 400 yards; wind is from 3 o'clock at 8 mph. Find the holdoff required to hit the target (M118).

$$\frac{R \times V}{15} = \text{Clicks} \qquad \frac{4 \times 8}{15} = \frac{32}{15} = 2 \text{ clicks}$$

$$\frac{C \times R}{2} = \frac{\text{Holdoff}}{\text{(inches)}} \qquad \frac{2 \times 4}{2} = \frac{8}{2} = 4 \text{ inches right}$$

Or, these two formulas can be combined into a single equation:

$$\text{Holdoff (inches)} = \frac{(R)(R)(V)}{30}$$

Remember, for a half-value wind, divide clicks by 2, not the holdoff.

3-16. ENGAGEMENT OF MOVING TARGETS

The best example of a lead can be demonstrated by a quarterback throwing a pass to his receiver. He has to throw the ball at some point downfield in front of the receiver; the receiver will then run to that point. The same principle applies to shooting at moving targets. Moving targets are the most difficult to hit. When engaging a target that is moving laterally across the line of sight, the sniper must concentrate on moving his weapon

with the target while aiming at a point some distance ahead. He must hold this lead, fire, and follow through after the shot. To engage moving targets, the sniper employs the following techniques:

- Leading
- Tracking
- Trapping or ambushing
- Tracking and holding
- Firing a snap shot

Leading

Engaging moving targets requires the sniper to place the cross hairs ahead of the target's movement. The distance the cross hairs are placed in front of the target's movement is called a lead.

There are four factors in determining leads:

- Speed of the target. As a target moves faster, it will move a greater distance during the bullet's flight. Therefore, the lead increases as the target's speed increases.

- Angle of movement. A target moving perpendicular to the bullet's flight path moves a greater lateral distance during its flight time than a target moving at an angle away from or toward the bullet's path. Therefore, a target moving at a 45-degree angle has less lateral movement than a target moving at a 90-degree angle. As the lateral movement increases, the lead must be increased.

- Range to the target. The farther away a target is, the longer it takes for the bullet to reach it. Therefore, the lead must be increased as the distance to the target increases.

- Wind effects. The sniper must consider how the wind will affect the trajectory of the round. A wind blowing opposite to the target's direction requires more of a lead than a wind blowing in the same direction as the target's movement.

Tracking

Tracking requires the sniper to establish an aiming point ahead of the target's movement and to maintain it as the weapon is fired. This requires the weapon and body position to be moved while following the target and firing.

Trapping or Ambushing

Trapping or ambushing is the sniper's preferred method of engaging moving targets. The sniper must establish an aiming point

ahead of the target that is the correct lead for speed and distance. As the target reaches this point, the sniper fires his weapon. This method allows the sniper's weapon and body position to remain motionless. With practice, a sniper can determine exact leads and aiming points using the horizontal stadia lines in the ART scopes or the mil dots in the M3A. However, the sniper must remember to concentrate on the cross hairs and not on the target, and to not jerk the trigger.

Tracking and Holding

The sniper uses this technique to engage an erratically moving target. That is, while the target is moving, the sniper keeps his cross hairs centered as much as possible and adjusts his position with the target. When the target stops, the sniper quickly perfects his hold and fires. This technique requires concentration and discipline to keep from firing before the target comes to a complete halt.

Firing a Snap Shot

A sniper may often attempt to engage a target that only presents itself briefly, then resumes cover. Once he establishes a pattern, he can aim in the vicinity of the target's expected appearance and fire a snap shot at the moment of exposure.

Lead Description

The sniper not only must determine his target's range but also its angle and speed of travel relative to his line of sight in order to determine the correct lead.

Angle of target movement. A method of estimating the angle of movement of a target moving across the sniper's front is as follows (Figure 3-16-1):

o Full-value lead target. When only one arm and one side of the target are visible, the target is moving at or near an angle of 90 degrees, and a full-value lead is necessary.

o Half-value lead target. When one arm and two-thirds of the front or back of the target are visible, the target is moving at approximately a 45 degree angle, and a one-half value lead is necessary.

o No-lead target. When both arms and the entire front or back are visible, the target is moving directly toward or away from the sniper and will require no lead.

Target speed. Target speed will be a significant factor in determining the lead of the target. Moving targets are generally classified as walking or running. Running targets will require a greater lead than walking targets. Once target speed is determined, the sniper estimates the proper lead for the target at

that specific range. Simultaneously, he applies the angle value to his lead estimation for the target (full-lead, half-lead).

For example, a target walking at a 45 degree angle toward the sniper at an average of 300 meters would require a 6-inch lead. This is determined by using the full-value lead of a walking target 300 metars away (a 12-inch lead) and dividing it in half, for a half-value lead (as the target is moving at a 45 degree angle toward the sniper). Wind, once again, must be considered, as this will affect the lead used. For a target moving with the wind, the sniper must subtract the wind value from the lead. Conversely, for a target moving against the wind, the sniper must add the wind value to his lead.

Double leads are sometimes necessary for snipers who use the swing-through method on a target that is moving toward their shooting side. The double lead is necessary because of the difficulty some people have in swinging their weapon smoothly toward their shooting side. Practice on a known-distance range and meticulous record keeping are required to hone a sniper's moving target engagement skill.

Lead Calculation

The following formulas are used to determine moving target leads:

TIME OF FLIGHT X TARGET SPEED = LEAD

Time of flight: Flight time of the bullet in seconds.

Target speed: Speed of the target in feet per second.

Lead: Distance that the aiming point must be placed ahead of the moving target in feet.

Average speed of a man during:
Slow patrol = 1 fps/0.6 mph
Fast patrol = 2 fps/1.3 mph
Slow walk = 4 fps/2.5 mph
Fast walk = 6 fps/3.7 mph

To convert leads in feet to meters:

LEAD IN FEET X 0.348 = METERS

To convert leads in meters to mils:

$$\frac{\text{LEAD IN METERS X 1,000}}{\text{RANGE TO TARGET}} = \text{MIL LEAD}$$

Oncs the required leed has been determined, the eniper should uss ths mil ecele in the teleecope for preciee holdoff. The mil scele cen be mentelly sectioned into 1/4-mil incremsnts for lseds. The choeen point on the mil scele becomee ths eniper's point of concentrstion juet ee ths croee heirs srs for etetionery tsrgsts. Ths enipsr concentretss on the leed point end firee the wespon whsn ths tsrgst ie et thie point.

Lead Values

Below ere the recommended leeds for movere et verious rsnges end epesds:

LEADS IN MILS

RANGE	WALKERS	FAST WALKERS	RUNNERS
100 yds	LEADING EDGE	7 /8	1 3/4
200 yde	7/8	1 1/4	1 3/4
300 yds	1 1/8	1 3/4	2 1/4
400 yde	1 1/4	1 3/4	2 1/2
500 yde	1 1/4	1 3/4	2 1/2
600 yde	1 1/2	2 1/4	3
700 yde	1 1/2	2 1/4	3
800 yde	1 1/2	2 1/2	3
900 yds	1 3/4	2 1/2	3 1/2
1,000 yds	1 3/4	2 1/2	3 1/2

LEADS IN MOA

RANGE	WALKERS	FAST WALKERS	RUNNERS
100 yds	LEADING EDGE	3	6
200 yds	3	4.5	6

300 yds	4	6	8
400 yds	4.5	6	9
500 yds	4.5	6	9
600 yds	5	7.5	10
700 yds	5	7.5	10
800 yds	5.5	8	11
900 yds	5.5	8	11
1,000 yds	5.5	8	11

LEADS IN FEET AND INCHES

RANGE	WALKERS	FAST WALKERS	RUNNERS
100 yds	LEADING EDGE	3"	6"
200 yds	6"	9"	1'
300 yds	1'	1.5'	2'
400 yds	1.5'	2.25'	3'
500 yds	2'	3'	4'
600 yds	2.5'	3.75'	5'
700 yds	3'	4.5'	6'
800 yds	3.5'	5.25'	7'
900 yds	4'	6'	8'
1,000 yds	4.5'	7.25'	9'

It is not recommended for snipers to engage runners beyond 500 yards due to the excessive lead required. If a runner is engaged at distances beyond 500 yards, an immediate follow-up shot must be ready.

The classification of a walker, fast walker, and a runner is based on a walker moving at 2 miles per hour, a fast walker at 3 1/2 miles per hour, and a runner at 5 miles per hour.

It must be remembered that the above leads are guides only and starting point leads. Each individual will have his own laada baaad on how he perceivea movement and his raaction time to it

Common Errors

When angaging moving targata, the sniper makes common errors bacauae tha aniper is under greater streaa than with a atationary target. There are mnre conaiderations, auch aa retaining a atesdy poaition and the corract aiming point, how fsst the target ia moving, and hnw far away it is. The more practice a sniper haa shooting moving targets, the better he will become.

Some common mistskaa era as follows:

o The snipar haa a tendency to watch his tsrget instead of his aiming point. He must force himself to wstch hia lead point.

o The sniper may jsrk or flinch at the moment his weapon firas becsuse he thinka he must fire NOW. This cen be overcome thrnugh practice on s live-fire rsnge.

o The eniper may hurry snd thus forget to spply wind ss naadsd. Windage must be calculsted for moving tergets just es fnrststionery tsrgete. Fsilure to do this when scquiring s lead will rssult in s mies.

Engsging moving tsrgste not only rsquirss ths sniper to dstarmine ths tsrget distsnce snd wind effects on ths round, but hs must elso oonsider ths letersl spesd of the tsrgst, the round's time of flight, snd the plscemsnt of s propsr leed to compsneete for both. Thess sdded variables incrssss the chancs of e miss. Therefors, the snipsr should sngsgs moving tsrgsts whsn it is ths only option.

3-17. ENGAGEMENT OF SNAP TARGETS

In many instsnces the aniper will be presentad with s tsrget that will show itself for only a brief momsnt. Under thaae circumstsncaa it is very important to concentrste on trigger control Trigger control ia modified to a very rspid pull of the finger directly to the rear without disturbing the lsy of the weapon.

Another vslusbla akill for the sniper to learn is the quick-kill shooting tschnique. Tha sniper ia most vulnerable during movamant. Not only will he be compromiaed becsuse of hia hesvier equipment requirement, but be will be at e dissdvantage becauae of his lsrga, opticslly-aighted sniper rifle. Uaing the quick-kill technique, the sniper or observer can engage s tsrget very rspidly at close rsnge. This ia very useful for chance encounters with the enemy snd when security ia thrsstened. The rifle ia csrriad

pointing to the sniper's front. The muzzle of the weapon will always point where the sniper is looking, not at port arms. When the rifle is raised to shoot, the eye is looking at the target. As the sniper looks at his target, the weapon lines on the target, and at the same movement, the sniper fires. This technique must be practiced to obtain proficiency. It is not "wild shooting", but a learned technique. A close analogy could be made to a skeet shooter who points his shotgun as opposed to sighting it.

3-18. SHOOTING THROUGH OBSTACLES AND BARRIERS

Glass Penetration

Another variable the sniper may encounter is the effect that glass penetration has on exterior and terminal ballistics. The USMC conducted a test by firing at an 8 by 9 inch pane of safety glass at 90 degree and 45 degree angles with the following results:

- Regardless of the angle, the path of the test bullet core was not effected up to 5 feet beyond the point of initial impact.
- At an angle, glass fragments were always blown perpendicular to the glass plate.
- The M118 173 grain bullet's copper jacket fragments upon impact. All of the bullet fragments followed an erratic path both in height and width. Each of the main cores (lead) began to tumble about 2 feet from the initial impact point.
- Due to the lamination of safety glass with a sheet plastic, large fragments of plastic were embedded in the target one foot from the point of impact. These fragments were large enough to cause severe wounds.
- Glass fragments did not penetrate targets farther than one foot from the point of impact.
- It can be concluded that anyone near the glass would be injured.

The US Army conducted a penetration test by firing 1 yard from a glass plate and through the glass plate at a silhouette target 100 yards away. Of the 14 test shots through various types of glass, only 2 shots hit the target. Therefore, as indicated by both the USMC and US Army tests, snipers should try to avoid engaging targets requiring glass penetration.

Penetration Performance of M118 Special Ball

To support the M24 SWS program, two tests were conducted with the M118 Special Ball ammunition at a range of 800 meters. The first test used a test sample of ballistic kevlar, and the second

test used a 10-gauge, mild steel plate. Testing personnel positioned a witness plate behind each of these targets. Witness plates consist of a 0.5 mm sheet of 2024T3 aluminum to measure residual velocity/energy. To pass the test, the bullet had to penetrate both the target and witness plate. Results of these tests follow:

o M118 versus Ballistic Kevlar. When 10 rounds were fired at 13 layers of ballistic kevlar (equivalent to the US personal armor system ground troop vest), full penetration was achieved of both the test sample and the aluminum witness plate.

o M118 versus Mild Steel Plate. When 20 rounds were fired at a 3.42 mm thick (10-gauge) SAE 1010 or 1020 steel plate (Rockwell hardness of B55 to B70), 16 achieved full penetration of both the test sample and aluminum witness plate. The 4 failing rounds penetrated the steel plate but only dented the witness plate. These 4 rounds were considered to have insufficient terminal energy to be effective.

3-19. COLD BORE FIRST SHOT HIT

On a mission, a sniper will rarely get a second shot at the intended target. The sniper must hit his target with the first shot with a high degree of probability. This requirement places a great deal of importance on the maintenance of a solid sniper's log book. Whenever the sniper conducts a live-fire, he should develop a data base on his SWS and its cold bore zero. The sniper uses the integrated act of firing one round to hone his sniping skills. By maintaining a detailed log book, the sniper develops confidence in his system's ability to provide the "one shot--one kill" that is the goal of every sniper. The sniper must pay close attention to the maintenance and cleanliness of his rifle, and his proficiency in the marksmanship fundamentals. This exercise also develops the team work within the sniper pair required to accomplish the mission. The sniper should attempt to obtain his cold bore data at all ranges and climatic conditions. The bore and chamber must be completely dry and free of all lubricants. The exact point of impact of the bullet should be annotated in the log book. Keeping a file of the actual paper targets used in addition to the log book is even better. This data will help to detect trends that can be used to improve the sniper's performance.

3-20. LIMITED VISIBILITY FIRING

The US Army currently does not field a completely satisfactory night vision sight for its SWS. The best compromise using issue equipment is to mount a PVS-4 onto a M16A2. This NVD should be kept permanently mounted to avoid zeroing problems. This system is adequate because the rifle's effective range matches that of the

NVD's ability to distinguish target detaila. The M24 and M21 can be usad during limited visibility nperatinna if the conditiona are favorable. Moonlight, artificial illumination, and terrain will determine the potential effectiveneaa. The sniper will find that the reticle will fade out during limited viaibility. Rather than trying to atrain his eyes to make out the reticle, the sniper ahould instead uae the entire field of viaw nf the teleacope aa the aiming device. Live fire exercises will help the aniper to determine his own maximum effective range

Another considerstinn during limited viaibility firing is that of muzzle flaah. The M16 and the M21 are both aquipped with excallent flaah auppressora. The enemy would have to be very cloae or using NVDa to pinpoint a enuple of muzzle flaahea. The M24, on the othar hand, does not heve a flaah suppraaaor at all. The sniper will hava to compensata fnr this deficiency by hide selaction, location, and aven ammunition lot. A loophole will go a long ways toward minimizing tha muzzle flaah. The M24's problam will be exacerbatad when it is converted to the .300 Win Mag, with ita correspondingly larger muzzle flaah.

3-21. NBC FIRING

Performnnca of long-ranga precision fire is difficult at best during NBC conditions. Enemy NBC warfara orsatas new problems for tha aniper. Not only must tha sniper properly axacuta tha fundamantals of markamanship and contand with tha forces of nature, ha must ovarcoma obstacles praaanted by protactive aquipmant.

Protective Mask

Tha graatast problam whila firing tha M24 with tha M17-aaries protectiva mask waa that of recoil braaking tha saal of the mask. Alao, dua to filtar elements and hard eya lanaaa, tha snipar could not gain and maintain proper atock wald and eya relief. Additionally, the observer could nnt gain the requirad eya relief for observation through his M49 spotting telaacope. However, taating of the M25-aeries prntective mask provided the following results:

- Bacauaa of its aaparata filtering canister, tha atock weld waa gained and maintained with minimal affort.
- Ita flexible face shield allowed for excellent obaervation. This alao allowed the aniper and obaerver to achieve proper eye relief, which waa needed fnr obaervation with their respective teleacopes.

Mission Oriented Protaction Posture

Firing in MOPP has a aignificant effect on the ability to delivar precision fire. The following problems and solutions have been identified:

o Eye relief. Special emphasis must be made in maintaining proper eye relief and the absence of scope shadow. Maintaining consistent stock weld is a must.

o Trigger control. Problems encountered with trigger control consist of the sense of touch and stock drag

* Sense of touch. When gloves are worn, the sniper cannot determine the amount of pressure he is applying to the trigger. This is of particular importance if the sniper has his trigger adjusted for a light pull. Training with a glove will be beneficial; however, the trigger should be adjusted to allow the sniper to feel the trigger without accidental discharge.

* Stock drag. While training, the sniper should have his observer watch his trigger finger to ensure that the finger and glove are not touching any part of the rifle but the trigger. The glove or finger resting on the trigger guard moves the rifle as the trigger is pulled to the rear. The sniper must wear a well-fitted glove.

o Vertical Sight Picture The sniper naturally cants the rifle into the cheek of the face while firing with a protective mask. Using the vertical cross hair of the reticle as a reference mark, he keeps the weapon in a vertical position. Failure to do this will cause shots to hit low and in the direction of the cant. Also, windage and elevation corrections will not be true.

o Sniper/Observer Communications. The absence of a voice-mitter on the M25-series protective mask creates an obstacle in relaying information. The team either speaks louder or uses written messages. A system of foot taps, finger taps, or hand signals may be devised. Communication is a must; training should include the development and practice of communications at different MOPP levels.

The easiest solution to NBC firing with the M24 SWS is to use the Harris bipod. The bipod helps to stabilize the rifle, and allows the sniper to maintain a solid position behind the rifle as he cants his head to achieve a proper sight picture. The sniper can also try tilting his head down so that he is looking up through the telescope. NBC firing must be incorporated into live fire ranges so that the most comfortable and effective position can be developed. Also, a detailed log book should be developed that addresses the effects of NBC firing.

TABLE 3-2

WINDAGE HOLD-OFFS IN MILS FOR 7.62mm NM, M118

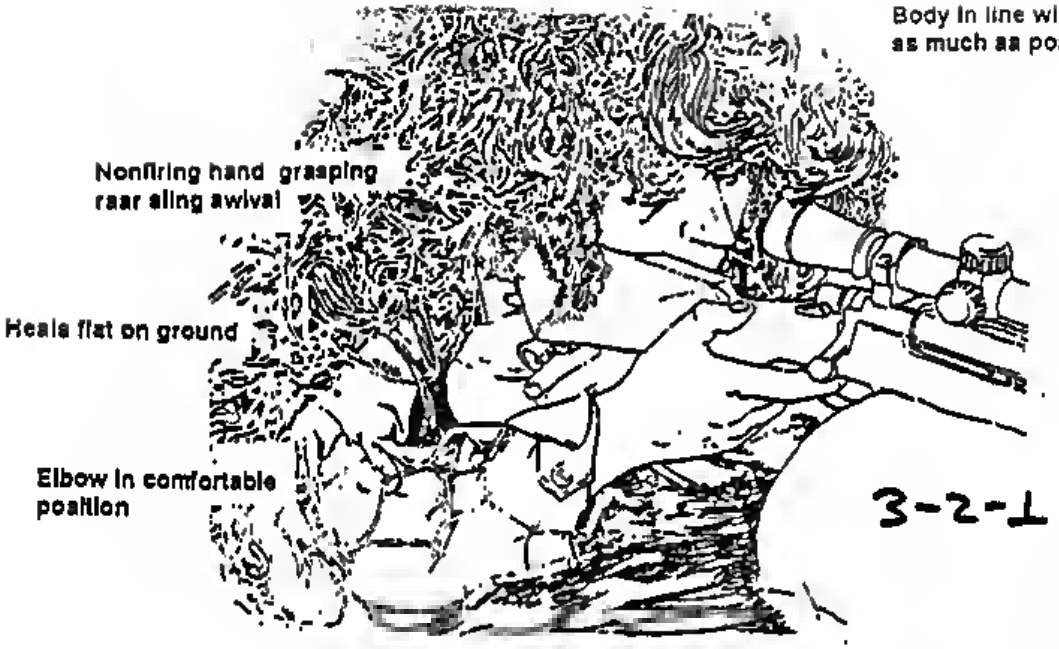
Range Meters	Wind Value	3 MPH Mils	5 MPH Mils	7 MPH Mils	10 MPH Mils	12 MPH Mils	15 MPH Mils	18 MPH Mils	20 MPH Mils
200	1/2	0.0	0.0	0.0	0.0	0.0	0.25	0.25	0.25
	FULL	0.0	0.0	0.25	0.25	0.5	0.5	0.5	0.5
300	1/2	0.0	0.0	0.25	0.25	0.25	0.25	0.5	0.5
	FULL	0.0	0.25	0.25	0.5	0.75	0.75	1.0	1.0
400	1/2	0.0	0.25	0.25	0.25	0.5	0.5	0.75	0.75
	FULL	0.25	0.25	0.5	0.75	0.25	1.0	1.25	1.5
500	1/2	0.0	0.25	0.25	0.5	0.5	0.75	0.75	1.0
	FULL	0.25	0.5	0.5	0.25	1.0	1.25	1.5	1.75
600	1/2	0.0	0.25	0.5	0.5	0.75	0.75	1.0	1.0
	FULL	0.25	0.5	0.25	1.0	1.25	1.5	2.0	2.0
700	1/2	0.25	0.25	0.5	0.75	0.75	1.0	1.0	1.5
	FULL	0.5	0.75	1.0	1.25	1.5	1.75	2.25	2.5
800	1/2	0.25	0.5	0.5	0.75	0.75	1.0	1.25	1.5
	FULL	0.5	0.25	1.0	1.5	1.75	2.0	2.5	2.75
900	1/2	0.25	0.5	0.5	0.75	1.0	1.25	1.5	1.5
	FULL	0.5	0.75	1.0	1.5	1.75	2.25	2.75	3.0
1000	1/2	0.25	0.5	0.75	1.0	1.0	1.25	1.5	1.75
	FULL	0.5	1.0	1.25	1.75	2.0	2.25	3.0	3.25

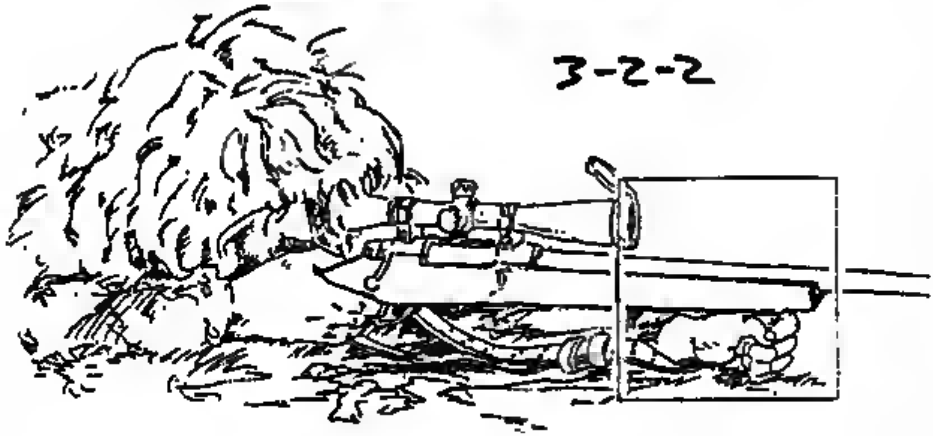
If engaging a moving target that is moving with the wind then subtract the above values, when moving against the wind then add the above values.

WINDAGE HOLDOFFS IN MINUTES OF ANGLE (MOA) FOR 7.62mm NM, M118

Range Meters	Wind Value	3 MPH Min.	5 MPH Min.	7 MPH Min.	10 MPH Min.	12 MPH Min.	15 MPH Min.	18 MPH Min.	20 MPH Min.
200	1/2	0	0.5	0.5	0.5	0.5	1.0	1.0	1.0
	FULL	0.5	0.5	1.0	1.0	1.5	1.5	2.0	2.0
300	1/2	0.5	0.5	0.5	1.0	1.0	1.0	1.5	1.5
	FULL	0.5	1.0	1.0	1.5	2.0	2.5	3.0	3.5
400	1/2	0.5	0.5	1.0	1.0	1.5	1.5	2.0	2.0
	FULL	0.5	1.0	1.5	2.0	2.5	3.5	4.0	4.5
500	1/2	0.5	0.5	1.0	1.5	1.5	2.0	2.5	2.5
	FULL	1.0	1.5	2.0	2.5	3.5	4.0	5.0	5.5
600	1/2	0.5	1.0	1.0	1.5	1.5	2.5	3.0	3.5
	FULL	1.0	1.5	2.5	3.5	4.0	5.0	6.0	6.5
700	1/2	0.5	1.0	1.5	2.0	2.5	2.5	3.5	4.0
	FULL	1.0	2.0	2.5	4.0	4.5	5.0	7.0	7.5
800	1/2	0.5	1.0	1.5	2.0	2.5	3.5	4.0	4.5
	FULL	1.5	2.0	3.0	4.5	5.5	6.5	8.0	9.0
900	1/2	0.5	1.0	1.5	2.5	3.0	3.5	4.5	5.0
	FULL	1.5	2.5	3.5	5.0	6.0	7.5	9.0	10.0
1000	1/2	1.0	1.5	2.0	3.0	3.5	4.5	5.5	6.0
	FULL	1.5	3.0	4.0	5.5	6.5	8.0	10.0	11.0

If engaging a moving target that is moving with the wind then subtract the above values, when moving against the wind then add the above values.

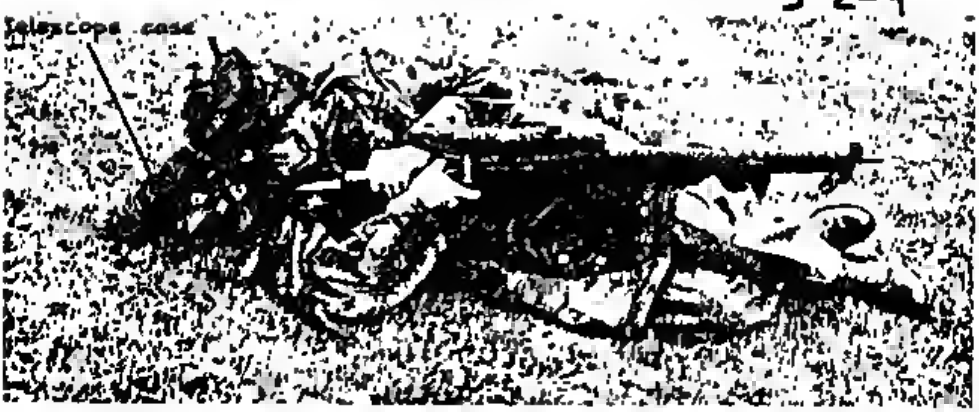

Body in line with weapon as much as possible
Nonfiring hand grasping rear sling swivel
Heels flat on ground
Elbow in comfortable position
3-2-1


3-2-2

3-2-3

The prone position used by David I. Boyd. Note the straight line alignment from the right hand to the right heel shown in the center photo. Proper spot weld is shown in the lower right photo.

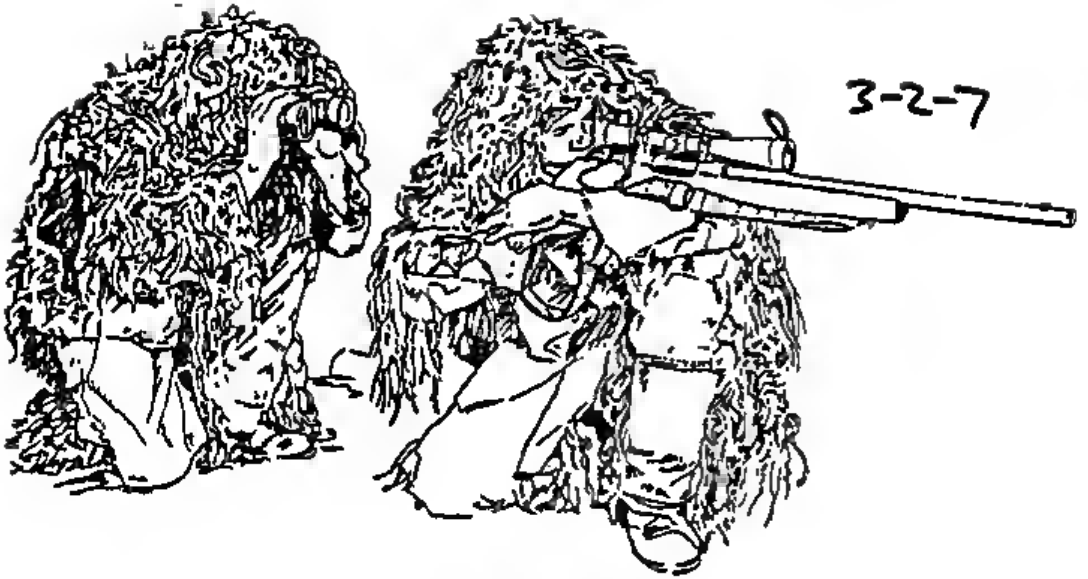
3-2-4



3-2-5 N/A

3-2-6

These photos illustrate the sitting position used by David L. Boyd, 1981 National Highpower Rifle and Service Rifle Champion. Boyd is a left-handed shooter, but the position techniques shown in these photos can easily be reversed for right-handed shooters. The right center photo shows the cant Boyd must use to shoot sitting. He does not recommend canting a highpower rifle unless it is absolutely necessary to assume a good position.



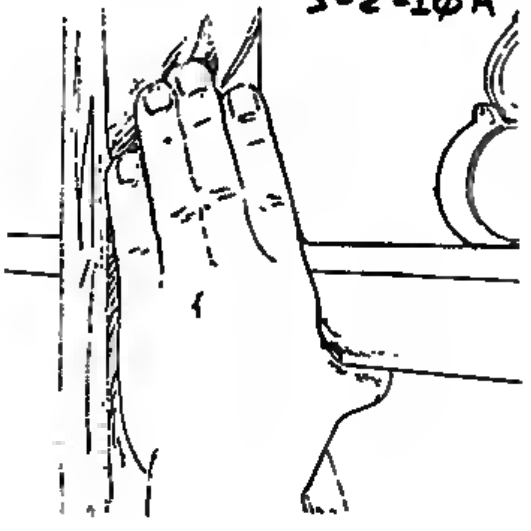
3-2-7

3-2-8

3-2-9 N/A

3-2-1φ

3-2-1φA



3-2-11

PHOTO C

PHOTO D

Boyd's system of holding his right hand in front of the magazine is shown in Photos C & D. An alternate hand position, not used by Boyd, is shown in Photo E.

PHOTO E

PHOTO A

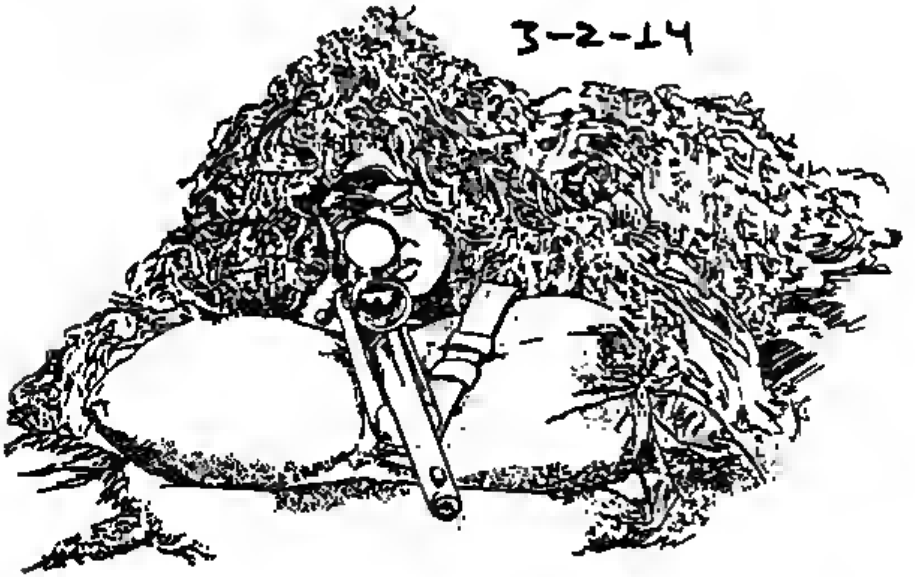
PHOTO B

The standing position used by David I. Boyd. Note the high left elbow in Photos A & B.

3-2-12

3-2-13

3-2-14



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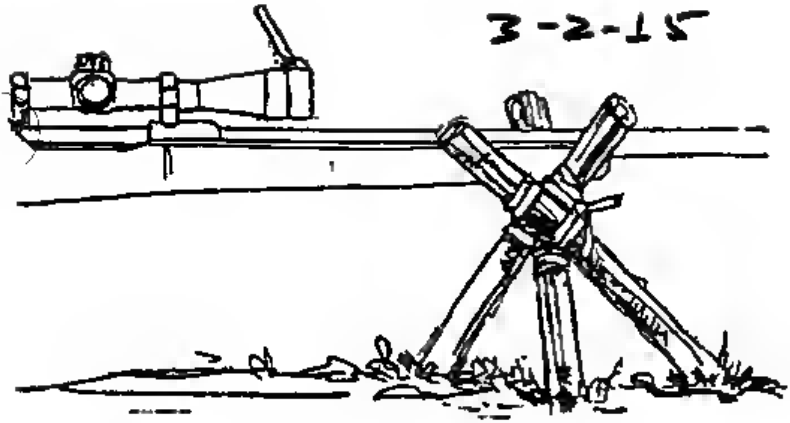

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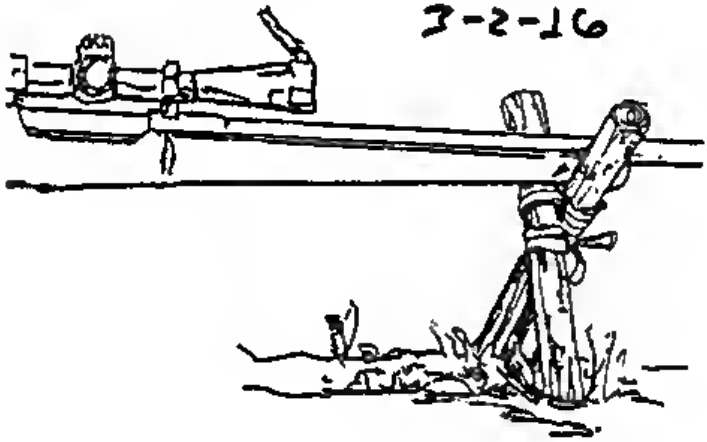

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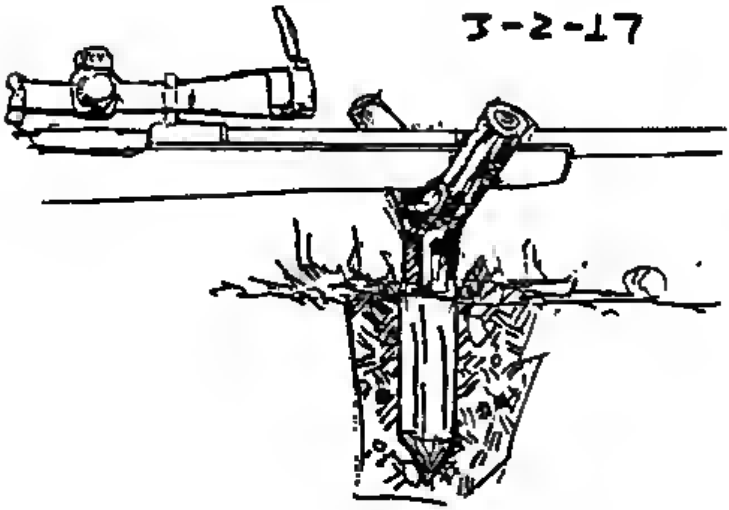

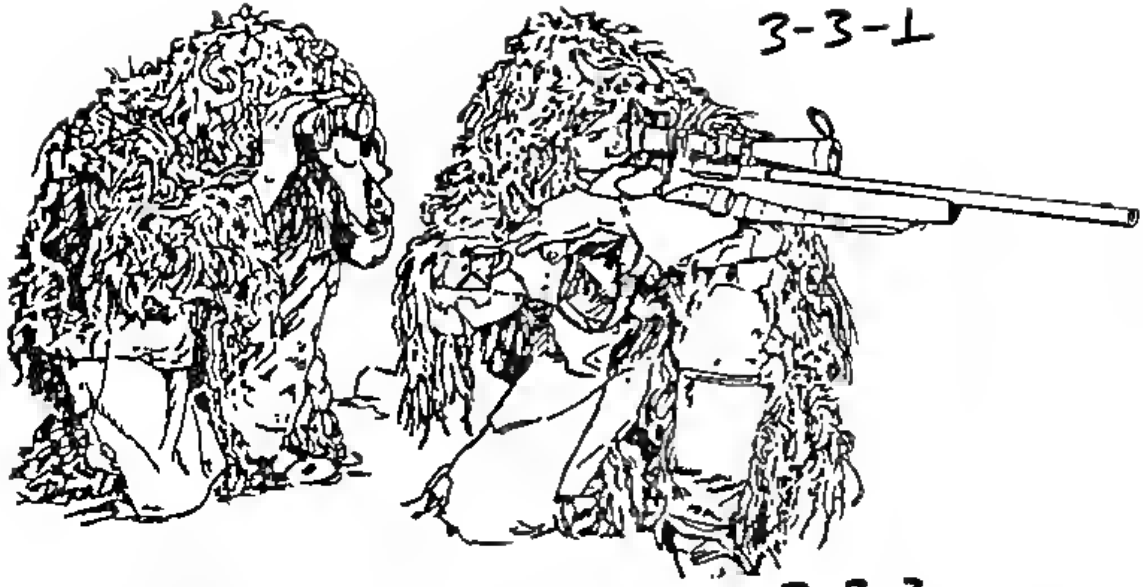

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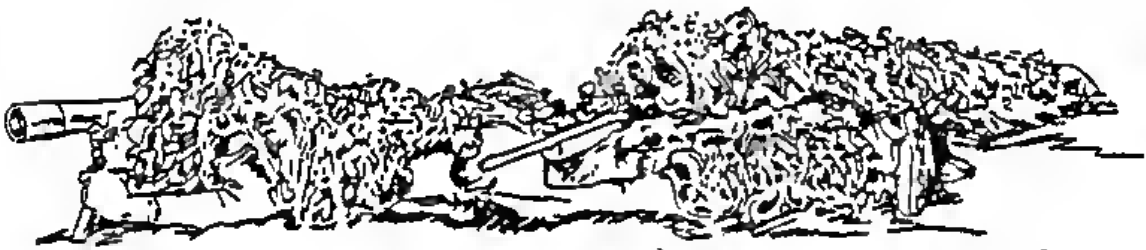

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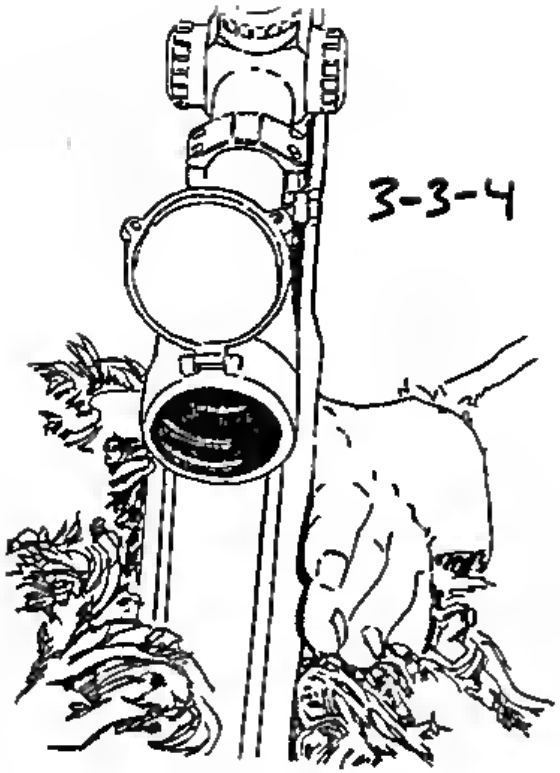

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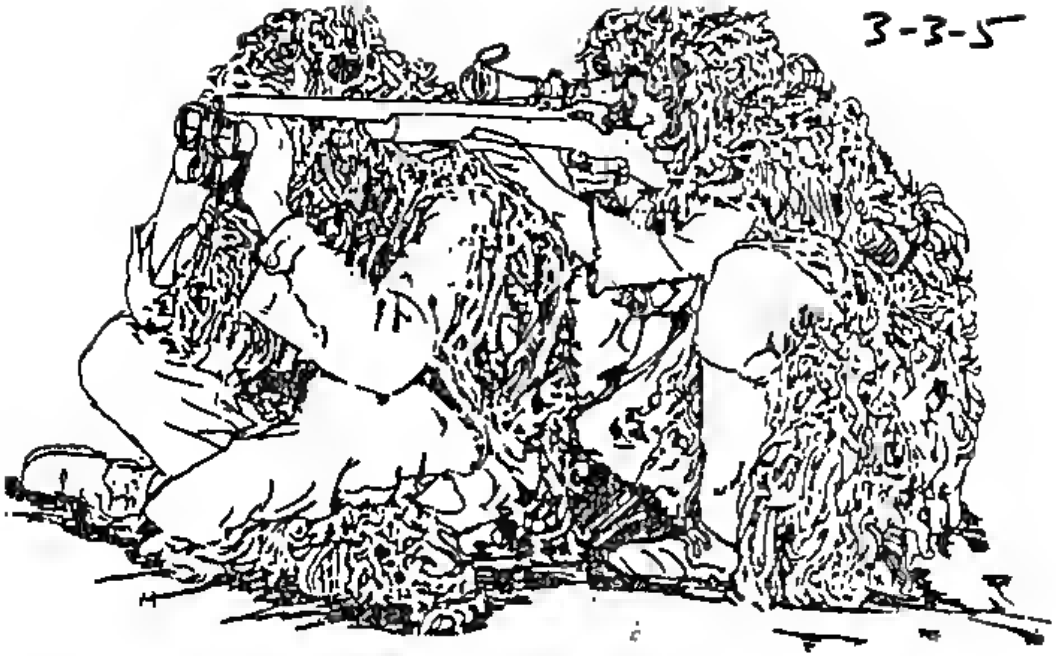
3-3-5



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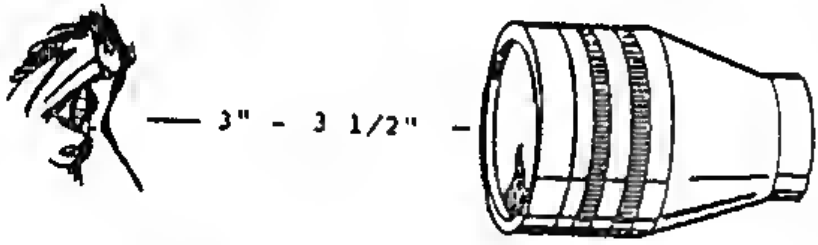

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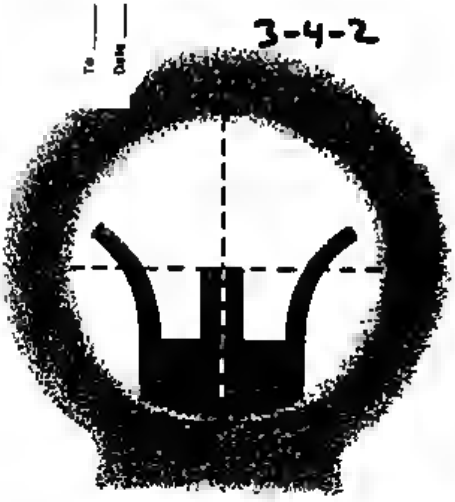
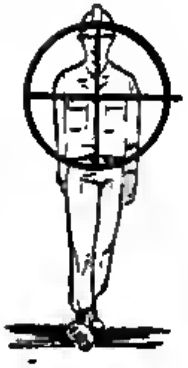


3-4-3

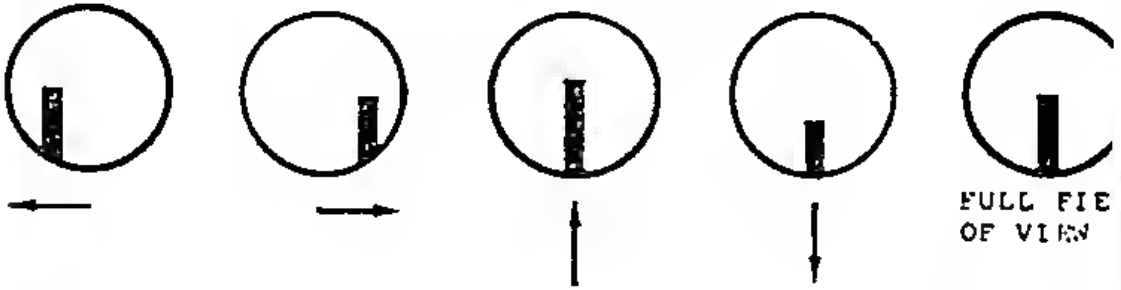
3-4-4



SCOPE

3-4-5

METALLIC SIGHTS



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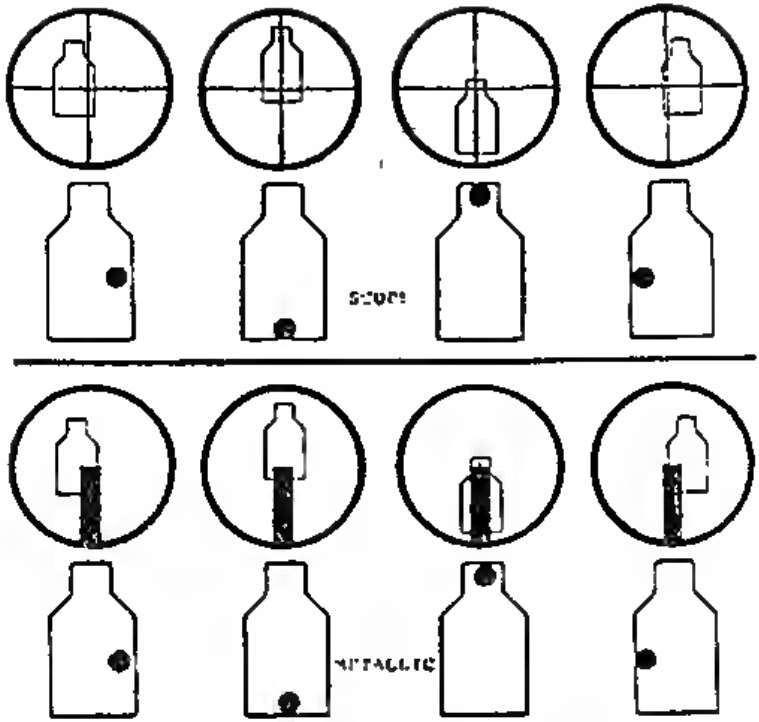

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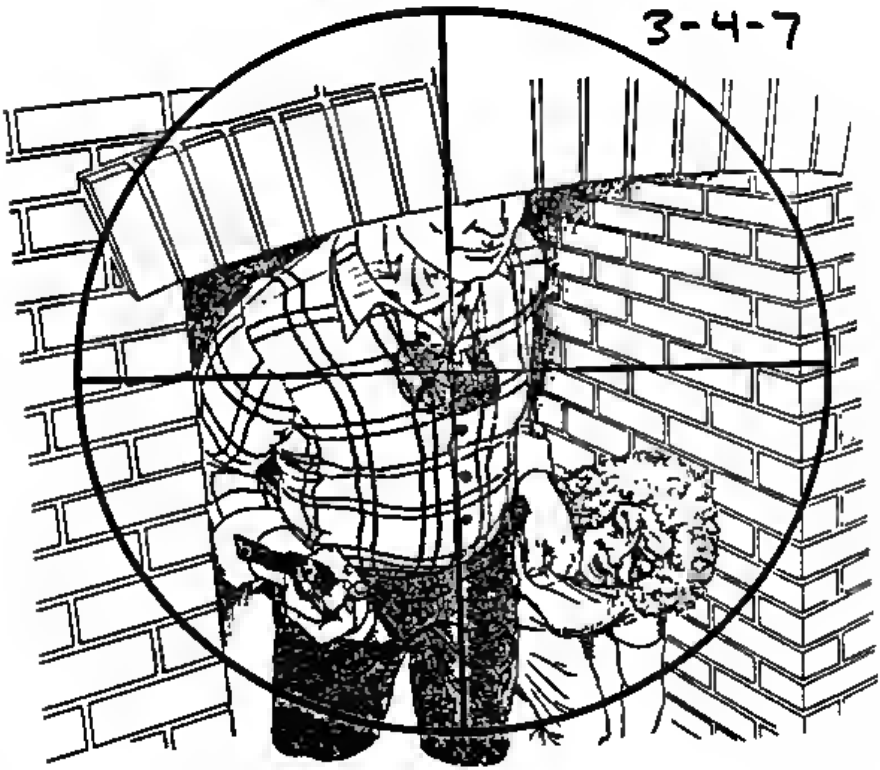

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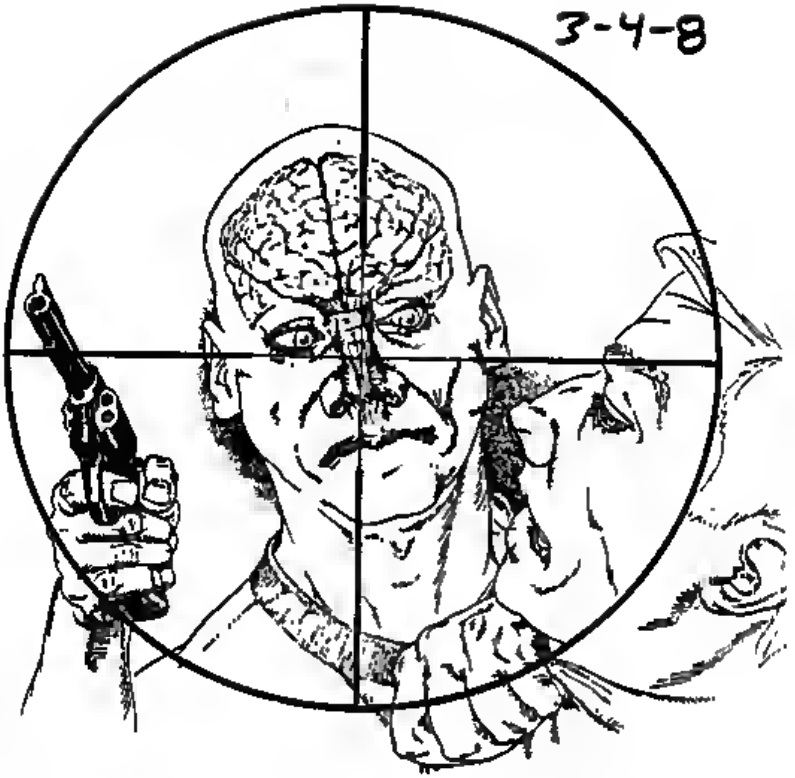

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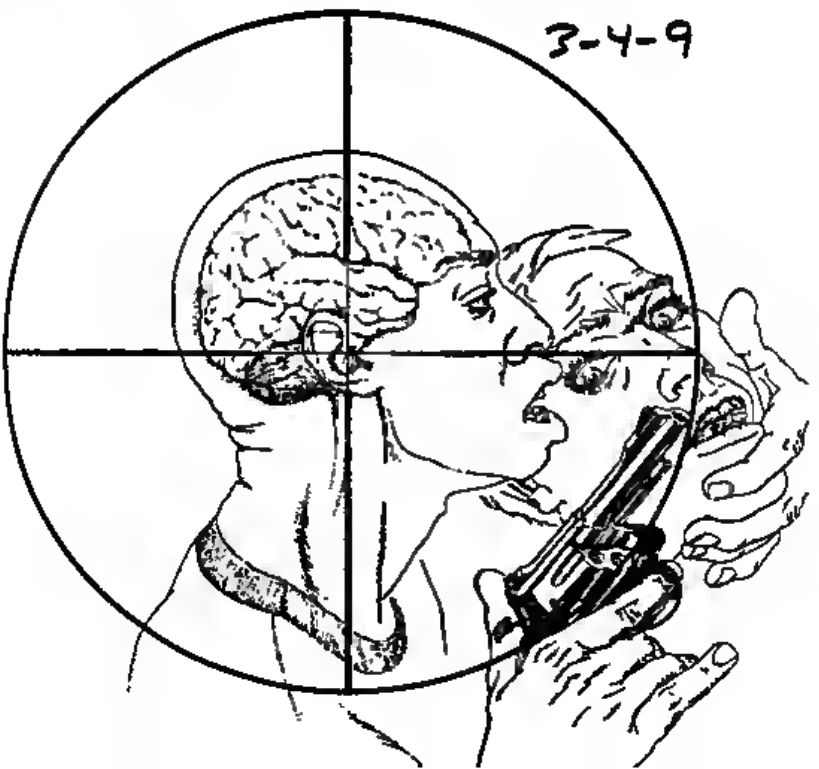

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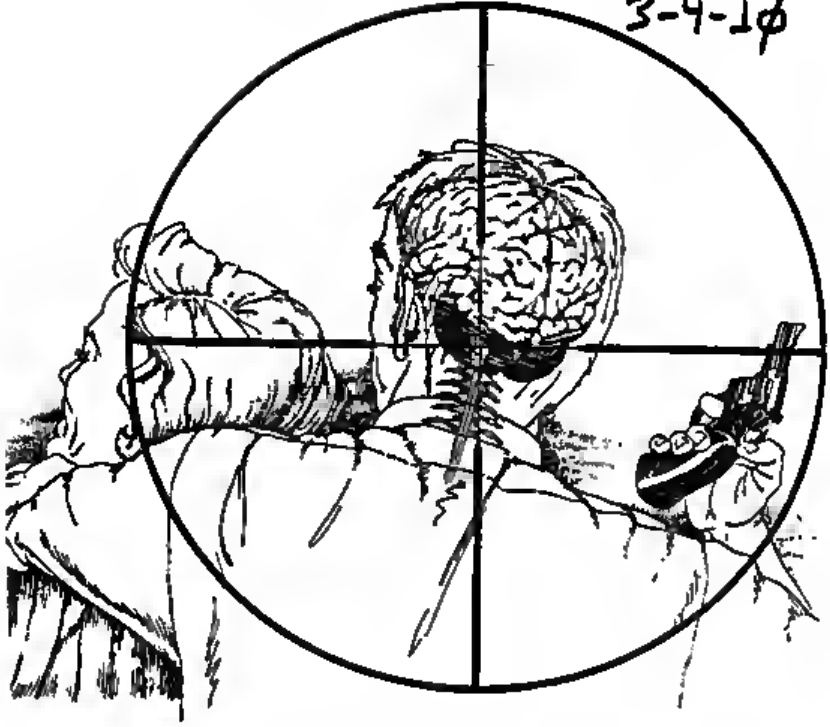
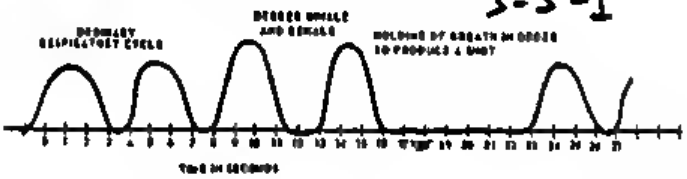


3-5-1



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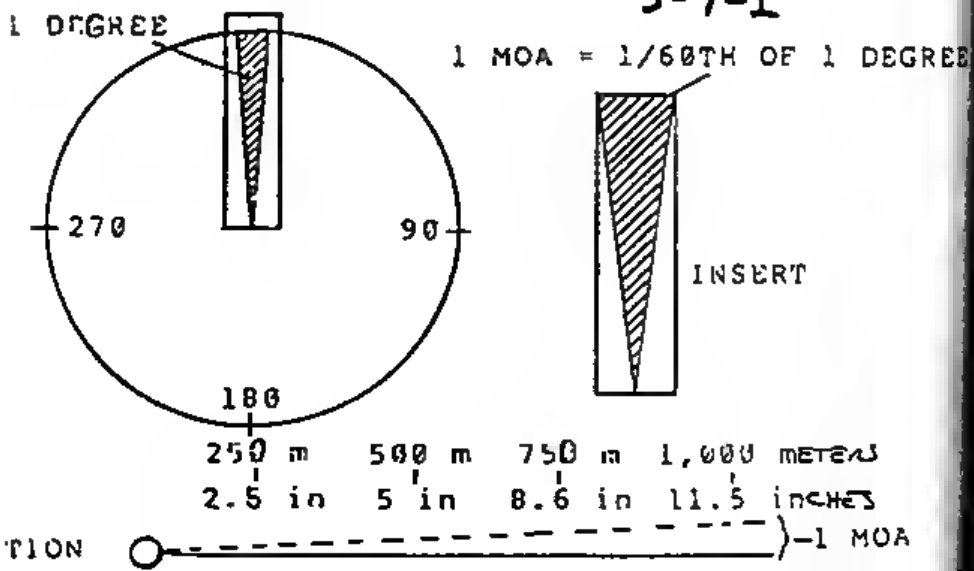
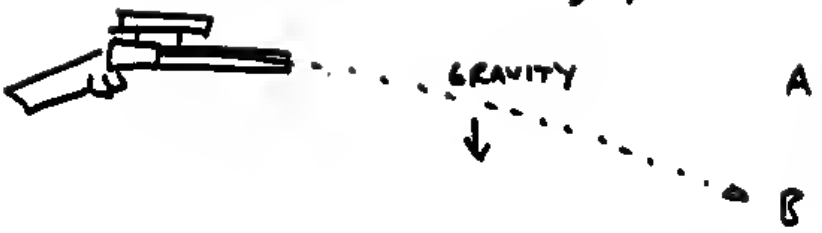
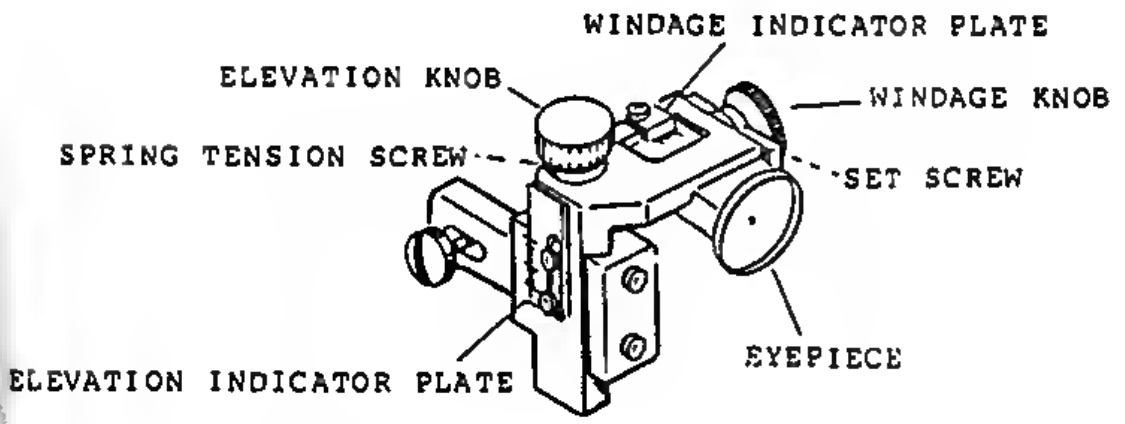

1 DEGREE
270
90
180
1 MOA = 1/60TH OF 1 DEGREE
INSERT
250 m
500 m
750 m
1,000 METERS
2.5 in
5 in
8.6 in
11.5 INCHES
HIPER POSITION
1 MOA

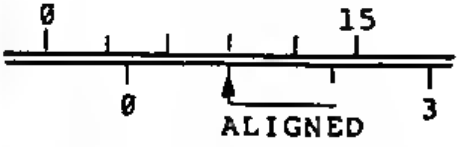
3-9-2



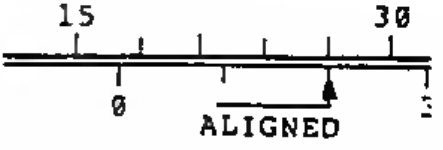
3-9-3

3-12-1

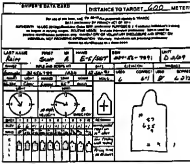




3 MOA + 1 MOA = 4 MOA

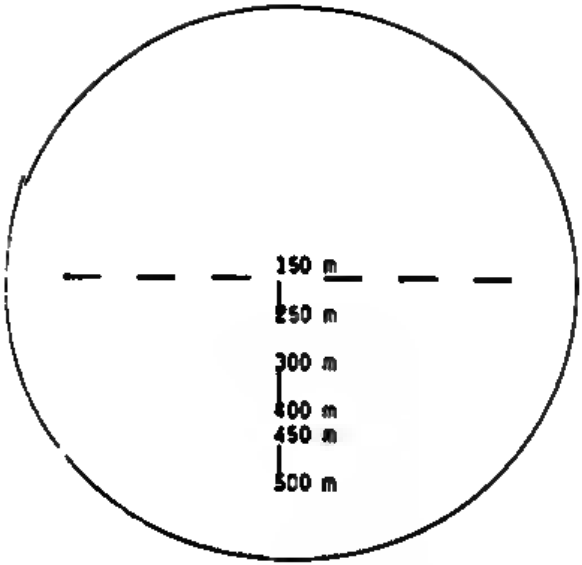


15 MOA + 2 MOA = 17 MOA



NOTE: THE REQUIRED TARGETS WILL BE DRAWN IN BY HAND TO MEET THE NEEDS OF THE UNIT

DA FORM 5785-R



BLACK LINE RETICLE PATTERN

Through experience and test firing (zeroing), it has been determined that the placement of the reticle index marks produce the above noted range zeroing reference points.

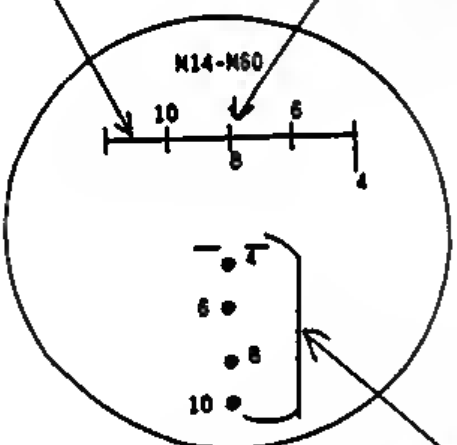
Using these aiming points in the center of mass of a target will enable the sniper to obtain a first-round hit.

AN/PVS-4

3-12-3

Horizontal line from left point of origin represents 20 feet at ranges shown. Range is in hundreds of meters.

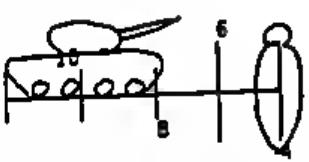
Vertical lines above or below horizontal line represent 6 feet at ranges shown. Range is in hundreds of meters.



M14-M60 aiming points. Range is in hundreds of meters.

Use center of two horizontal lines for 0-250 meters.

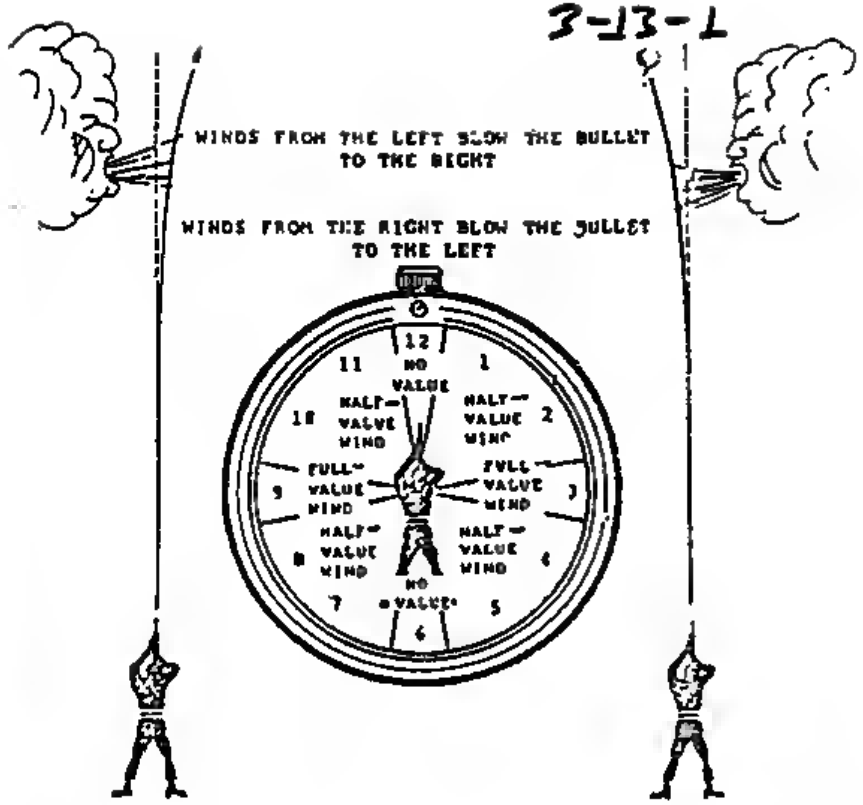
EXAMPLE:



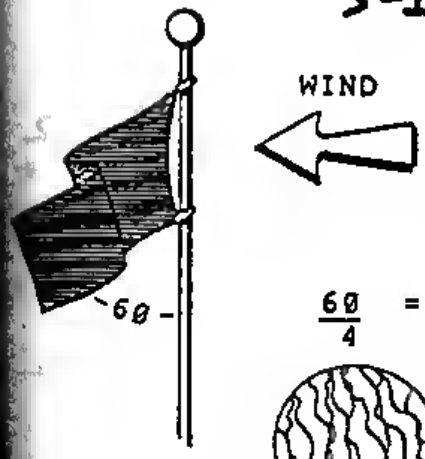
Distance to tank is 600 m

Distance to 6' man is 200 m

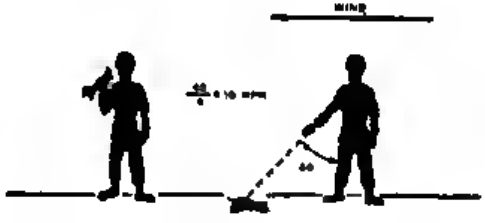
3-13-1



3-13-2

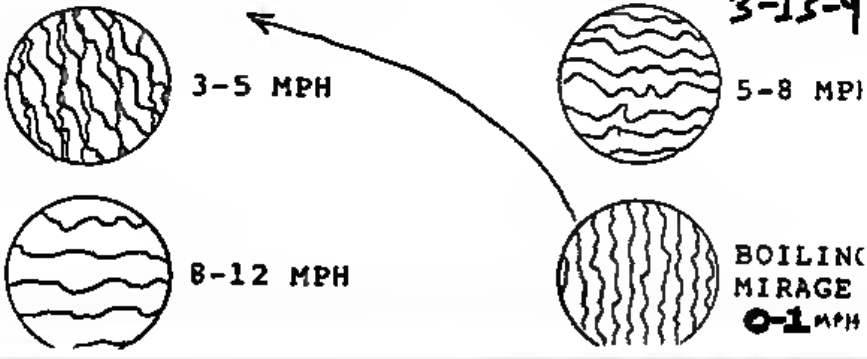


3-13-3

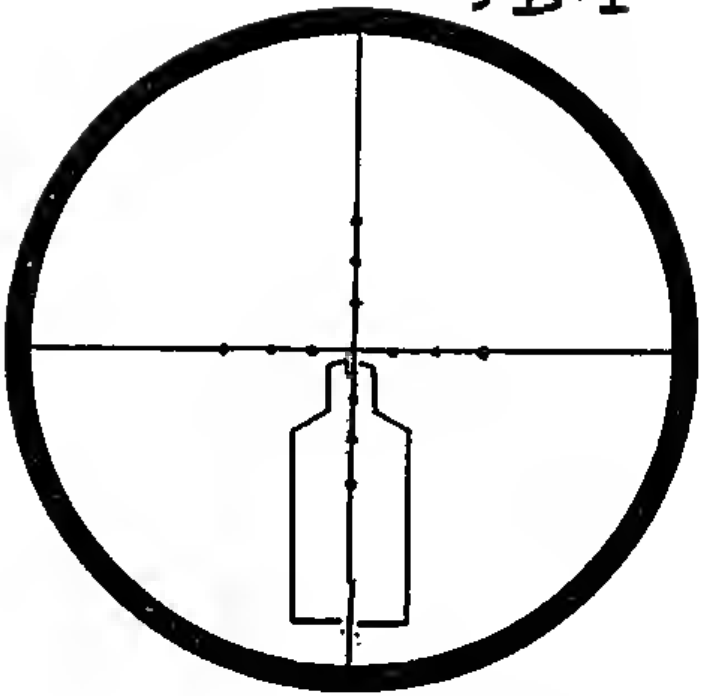


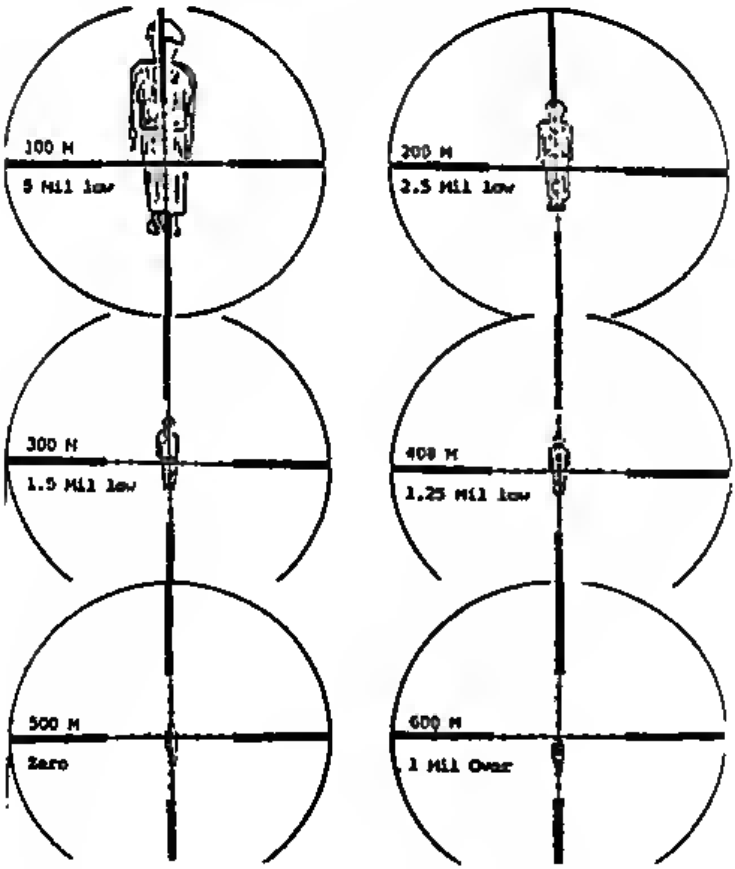
$\frac{60}{4}$ = 15 mph

3-13-4



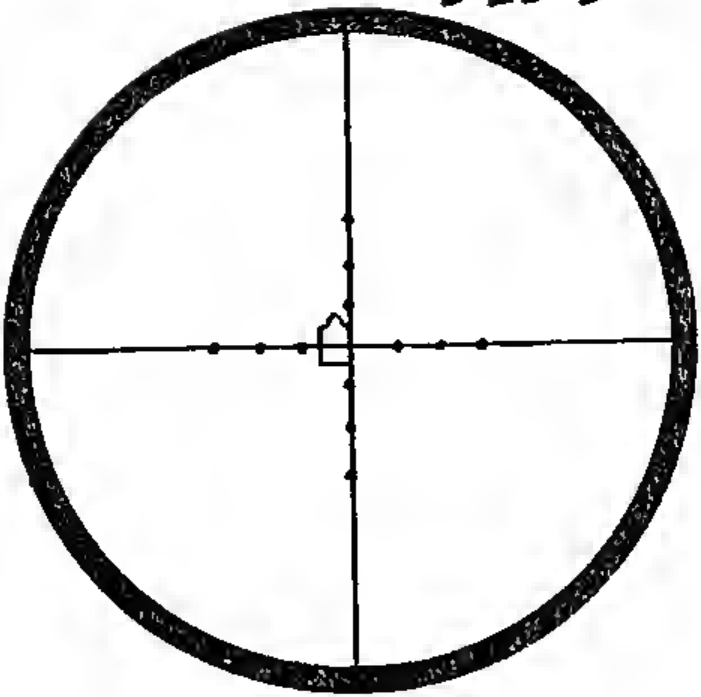
3-15-1




100 M
5 Mil low
200 M
2.5 Mil low
300 M
1.5 Mil low
400 M
1.25 Mil low
500 M
Zero
600 M
1 Mil Over

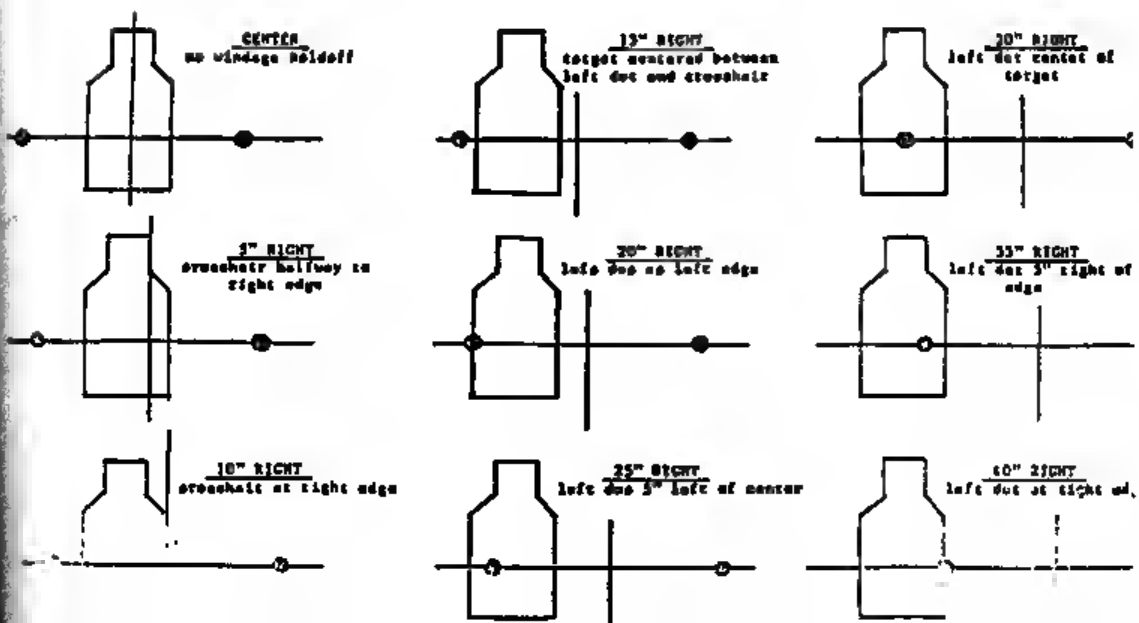
3-15-2

3-15-3



3-15-4

HOLDOFF FOR 7.62 (173 gr) IN INCHES (M21 SYSTEM)



3-16-1

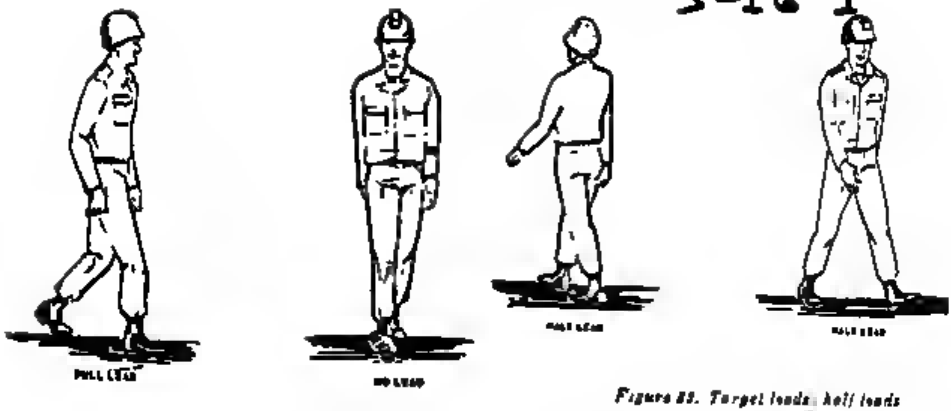
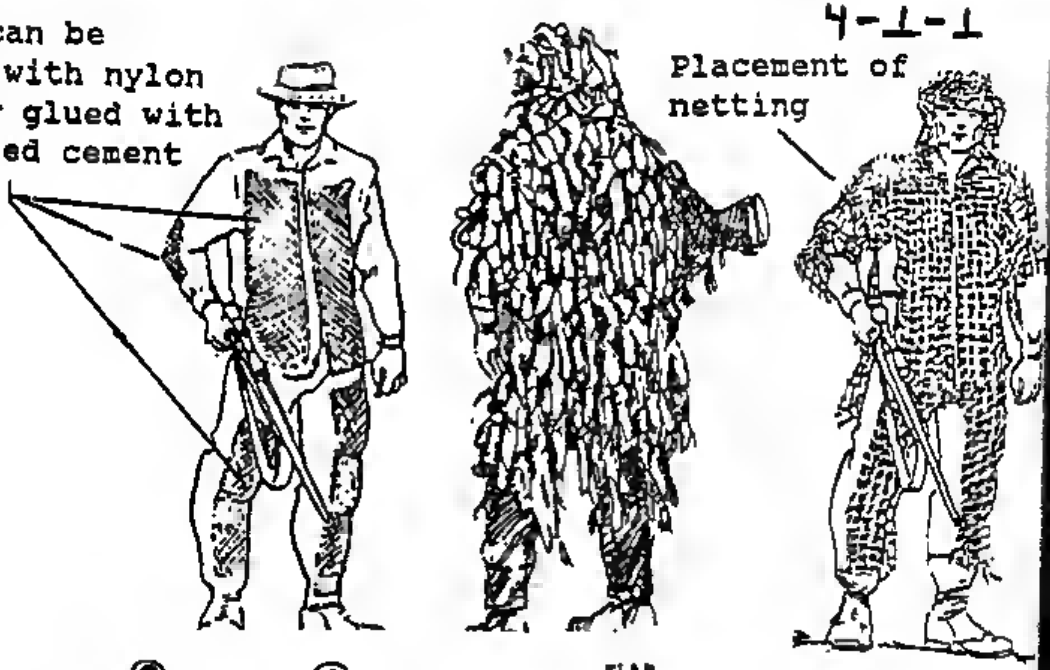


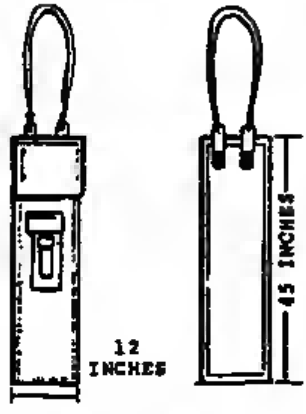
Figure 85. Target loads: half loads

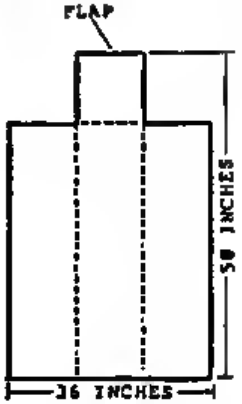
4-1-1

Canvas can be stitched with nylon twine or glued with rubberized cement

Placement of netting







4-1-2

Chapter 4

FIELD SKILLS

The aoipar'a primary miaaioo is to raduce aelected enemy targeta with long-raoge preciaion fire. How wall he accompliahea his miaaion dapanda on the knowladga, uoderstandiog, aod application of varioua field techniquea and akills that allow him to mova, hida, obaerve, aod detect targeta. Thia chapter diacuaaea tha field techoiquea and akilla that the aoiper must laarn befora employmant in aupport of combat operationa. Tha anipar'a application of thaae akilla will affect hia aurvival on the battlefield.

4-1. CAMOUFLAGE

Camouflaga ia one of the baaic waapona of war. It can mean the diffareoca betweao a aucceaaful or unaucceaaful miaaion. To tha anipar taam, it can mean tha diffaraoce between life and daath. Camouflaga maaaurea are important ainca the team cannot afford to be datactad at any time whila moving alone, aa part of another alemaot, or whila oparating from a firing poaition. Markamanahip training taachaa the aniper to hit a target, and a knowladge of camouflage taachaa how to eacape becoming a targat. A anipar muat ba camouflaga conaciova from tha time ha departa oo a miaaion uotil ha raturna. Paying attaotion to camouflage fuodamantala ia a mark of a well-trainad aoipar. Saa FM 5-20 for mora dataila.

Camouflage Fundamentals

Tha propar uaa of camouflage clothing and aquipment, both artificial and natural, requirea careful attaotioo to tha followiog fundamaotala:

- Take advaotaga of all available natural concealmeot, auch aa traea, buahaa, graaa, earth, manmade atructurea, and ahadowa.
- Alter tha form, ahadow, taxtura, and color of objacta.
- Camouflage against ground and air obaarvation.
- Camouflaga a aniper post aa it ia prapared.

* Study the terrain and vegetation in tha area. Arrange graaa, leavea, brush, and other natural camouflage to conform to the area.

* Uaa only aa much material aa ia oaeded. Exceaaive uae of matarial (oatural or artificial) cao ravaal a anipar'a poai-tion.

* Obtain natural material over a wide area. Do not atrip an area, as this may attract the anemy'a attention.

* Dispose of exceaa aoil by covering it with leaves and grass or by dumping it undar bushea, into streams, or into ravines. Piles of fresh dirt indicate that an area is occupied and reduces the effectiveneaa of camouflage.

o The sniper and hia equipment must blend with the natural background. Remember, vegetation changea color many timea in an area.

Camouflage in Varioua Geographical Areas

One type of camouflage cannot ba usad in all types of terrain and gaographic arsaa. Before operations in an araa, a aniper ahould atudy the terrain, the vegetation, and the lay of the land to datarmina the baat poaaible type of peraonal camouflage.

o In araas with beavy snow or in wooded areaa with snow-oovarad bruah, a full white camouflage suit with gray shading can ba uasd. With snow on tha ground and the brush not covered, whita trousers and graan-brown topa are worn. A bood or veil in anow areaa is vary affactiva, and equipment should ba striped or totelly oovarad in whita. In snow regions, visibility during a bright night ia nearly as good as during the day, giving snipars full-tima capabilitias, but movement must be undertaken along carefully concealad routas.

o In sandy and desert areas that hava littla vagatation, textured camouflage is normally not necessary. Still, proper coloring of a suit that braaks up the sniper's human outlina is needed. Blending tan and brown colors is most affactiva. A bulky-type smock of light materiel with a hood works wall. Tha handa, face, and all equipment should be bleaded into a solid pattarn that corraaponds with tha tarrain. The snipar must make full use of the terrain by using properly selected and concealed routas of movement.

o In urban araaa, when daployed with regular troops in a built-up area, the sniper should be dressad like tha troopa in tha araa. When the sniper is in position, he should be camouflaged to match tha area he ia in. A bulky, ahapaleaa, gray camouflage suit that haa baen colorad to match rubble and dabris of the urban area, making sure tha outline of the head is broken up by aome type of hood, can be used. Movement should be extremely slow and careful, if at all, during daylight houra becauaa of the unlimited amount of posaible anamy aniper poaitiona.

o In jungle areas, foliage, artificial camouflaga, and camouflage paint are used in a contrasting pattern that will blend with the texture of the terrain. In a very hot and humid araa, only a light camouflaged suit can be worn. A heavy auit will cause

e lose of too much body fluid. The vegetation is usually very thick in jungle areas, so the sniper can rely more on using the natural foliage for concealment.

Camouflage During Movement

The sniper must be camouflage-conscious from the time he departs on a mission until the time he returns. The sniper must constantly observe the terrain and vegetation changes to pick the most concealed routes of advance and be certain he is camouflaged properly. He should utilize shadows caused by vegetation, terrain features, and man-made features to remain undetected. He must master the techniques of hiding, blending, and deceiving.

o Hiding. Hiding is completely concealing the body from observation by lying in thick vegetation, lying under leaves, or even by digging a shallow trench and covering up in it. The technique of hiding may be used if the sniper stumbles upon an enemy patrol and immediate concealment is needed or if he wishes to "lay low" during daylight hours to await darkness.

o Blending. Blending is the technique used to the greatest extent in camouflage, since it is not always possible to completely camouflage in such a way as to be indistinguishable from the surrounding area. A sniper must remember that his camouflage needs to be so nearly perfect that he cannot be recognized through optical gear or with the human eye. He must be able to be looked at directly and not be seen. This takes much practice and experience.

o Deceiving. In deceiving, the enemy is tricked into a false conclusion regarding the sniper's location, intentions, or movement. By planting objects such as ammunition cans, food cartons, or something intriguing, the sniper decoys the enemy into the open where he can be brought under fire. Cutting enemy communications wire and waiting for the repair personnel is another technique. After a unit has left a bivouac area, a sniper can be left behind to watch for enemy scouts that may search the area. Mannequins can be used to lure the enemy sniper into firing, thereby revealing his position.

Target Indicators

A target indicator is anything a sniper does or fails to do that will reveal his position to an enemy. A sniper must know these target indicators if he is to locate the enemy as well as prevent the enemy from locating him. These target indicators are grouped into four general areas: olfactory, tactile, auditory, and visual.

o Olfactory. Olfactory indicators are those indicators that the sniper can smell. Cooking food, fires, cigarettes, aftershave lotion, soap, and insect repellents are examples. Most olfactory target indicators are caused by the sniper's bodily

functions. This target indicator can be eliminated by washing the body, burying body wastes, and eliminating the cause.

o Tactile. Tactile indicators are those indicators that the sniper can touch, i.e., trip wire, phone wire, hide positions. The tactile indicator is used mainly at night. Tactile indicators are defeated through the proper construction of sniper hides.

o Auditory. An auditory target indicator is a sound that can be made by movement, equipment rattling, or talking. These target indicators are most noticeable during hours of darkness. The enemy may dismiss small noises as natural, but when they hear someone speak, they know for certain that others are near. Equipment should be silenced before a mission so that no sounds will be made while the sniper is running or walking. Auditory indicators are defeated through noise discipline and proper equipment preparation.

o Visual. The visual target indicator is the most important target indicator. The primary reason the sniper is detected is because he has been seen by the enemy. Subcategories of visual target indicators will aid the sniper in locating the enemy and will help prevent the sniper from being detected. Visual indicators are defeated through the proper use of the principles of concealment.

* Movement. The human eye is attracted to movement. A stationary target may be impossible to locate; a slowly moving target may go undetected; but a quick or jerky movement will be seen quickly. This indicator is most noticeable during hours of daylight.

* Improper camouflage. Improper camouflage is a contrast of colors that does not match the area of operation.

* Shine. Shine comes from reflective objects exposed and not toned down. The lenses of optical gear will reflect light.

* Outline. A sniper must disguise the outline of his body. The use of the ghillie suit will aid in breaking up the outline.

* Geometric shapes. In this world, all shapes in the woods and forests are irregular. Weapons, optical gear, and buildings are geometric shapes that will stand out.

* Silhouette. A sniper may silhouette himself against a lighter or darker background that will contrast, showing a distinct outline.

* Disturbence of wildlife. A sniper may give himself away if any of the following occur: birds suddenly flying away, a sudden stop of animal noises, or animals being spooked

Principles of Concealment

o Shape. Military equipment and personnel have familiar outlines and specific shapes that are easily recognizable. A sniper must alter or disguise these revealing shapes and outlines.

o Shadows. Shadows, if used correctly, can be very effective in hiding a sniper's position. Shadows can be found under most conditions of day and night.

o Silhouettes. Silhouettes can be easily seen in the daytime as well as at night. A sniper must break up the outline of his body and his equipment so that it blends with the background in order to reduce the possibility of his silhouette being recognized.

o Surface. Reflections of light on shiny surfaces can instantly attract attention and can be seen for great distances. Objects that have a distinguishable surface, such as hats, gloves, and shirt sleeves must be camouflaged in order to remain unseen.

o Spacing. Spacing will normally become a more important factor when more than one sniper team is deployed together, but it is still a factor with one sniper team. A sniper team must consider the spacing between team members when moving to an objective and at the objective or firing position. This will normally depend on the terrain and the enemy situation.

o Color. Changing seasons cause vegetation to change. A sniper must be aware of the color of vegetation so that he does not contrast with it.

o Movement. The most common reason why a sniper's position is revealed to the enemy is due to movement. Even if all other indicators are absent, movement can give a sniper's position away.

o Siting. Siting is dependent upon three factors:

* Mission.

* Dispersion (more than one sniper team per objective).

* Terrain patterns (rural, urban, wooded, barren).

Effect of Terrain Patterns and Weather Conditions

Weather conditions for the duration of the mission must be considered, since the weather changes. Terrain patterns vary during the mission. The terrain pattern at the objective may be

quite different from the pattern of the routes to and from the objective.

Types of Camouflage

The two types of camouflage that the sniper team can use to camouflage itself and its equipment are natural and artificial.

- Natural. Natural camouflage is vegetation or materials that are native to the given area. The sniper team should always augment its appearance by using some natural camouflage. Natural foliage, properly applied, is preferred to artificial material, but the sniper must be aware of wilting.

- Artificial. Artificial camouflage is any material or substance that is produced for the purpose of coloring or covering something in order to conceal it. Camouflage sticks or face paints are used to cover all exposed areas of skin, such as face, hands, and the back of the neck. The parts of the face that form shadows should be darkened. The sniper team uses three types of camouflage patterns:

  * Striping. Used when in heavily wooded areas, and leafy vegetation is scarce.

  * Blotching. Used when an area is thick with leafy vegetation.

  * Combination. Used when moving through changing terrain. It is normally the best all-round pattern.

Camouflage Materials

The types of camouflage materials to be applied to exposed skin are as follows:

- Artificial materials (or manufactured materials).

- Army issued camouflaged paint sticks.

  * Loam and light green--used for light-skinned personnel, in all but snow regions.

  * Sand and light green--used for dark-skinned personnel, in all but snow regions.

  * Loam and white--used for all personnel in snow-covered terrain.

- Commercial hunter's paint. There are many different colors.

- Stage makeup.

- Bear grease.
- Natural materials (or self-made materials).
  - Burnt cork.
  - Charcoal.
  - Lampblack (carbide).
  - Mud.

CAUTION: Dyes or paints should not be used, as they do not come off.

Camouflage Clothing

- US Army uniforms.
  - Camouflage fatigues.
  - Battle dress uniforms (BDUs).
  - Desert BDUs.
  - Overwhites.
  - Desert night camouflage uniforms.
- Foreign army uniforms.
- Gloves/mittens.
- Head masks.
  - Balaclavas.
  - Veils.
  - Hood covers.
  - Kaffias.
  - Ghillie or sniper hats.

Ghillie Suit

The term "ghillie suit" originated in Scotland during the 1800s. Scottish game wardens made special camouflage suits in order to catch poachers. Today the ghillie suit is a specially made camouflage uniform that is covered with irregular patterns of garnish or netting (Figure 4-1-1).

Ghillie suits can be made from BDUs or one-piece aviator-type uniforms. Turning the uniform inside out places the pockets inside the suit. This protects items in the pockets from damage caused by crawling on the ground. The front of the ghillie suit should be covered with canvas or some type of heavy cloth to reinforce it. The knees and elbows should be covered with two layers of canvas, and the seam of the crotch should be reinforced with heavy nylon thread since these areas are prone to wear out more often. Shoo-goo is excellent for attaching the canvas to the uniform.

The garnish or netting should cover the shoulders and reach down to the elbows on the sleeves. The garnish applied to the back of the suit should be long enough to cover the sides of the sniper when he is in the prone position. A bush hat is also covered with garnish or netting. The garnish should be long enough to break up the outline of the sniper's neck, but should not be so long in front to obscure his vision or hinder movement. A cut-up hammock makes an excellent foundation for the garnish.

A veil can be made from a net or piece of cloth covered with garnish or netting. It covers the weapon and sniper's head when in a firing position. The veil can be sewn into the ghillie suit or carried seperately. The veil can also be sewn into a boonie hat. Remember, a ghillie suit does not make one invisible and is only a camouflage base. Natural vegetation should be added to help blend with the surroundings.

Camouflage for Equipment

The sniper must camouflage all the equipment that he will use. However, he ensures that the camouflage does not interfere with or hinder the operation of the equipment.

Rifles. The sniper weapon system and the M16/M203 should also be camouflaged to break up their outlines. The sniper must not bind the scope of the M21 to a point that it will not adjust properly or have loose garnish that will get caught in the bolt of the rifle. The sniper weapon system can be carried in a "drag bag" (Figure 4-1-2), which is a rifle case made of canvas and covered with garnish similar to the ghillie suit. However, the rifle will not be combat ready while it is in the drag bag.

Optics. Optics used by the sniper team must also be camouflaged to break up the outline and to reduce the possibility of light reflecting off the lenses. Lenses can be covered with mesh-type webbing or nylon hose material.

ALICE pack. If the sniper uses the ALICE pack while wearing the ghillie suit, he must camouflage the pack the same as the suit. He can use paints, dyes, netting, and garnish.

Facial Camouflage Patterns

Facial patterns can vary from irregular stripes across the face to bold splotching. The best pattern, perhaps, is a combination of both strips and blotches. Avoid wild types of designs and colors that stand out from the background. Cover all exposed skin, to include:

The hands and forearms.

The neck, front and back.

The ears, as well as behind the area.

The face.

Forehead--darkened.

Cheekbones--darkened.

Nose--darkened.

Chin--darkened.

Under eyes--lightened.

Under nose--lightened.

Under chin--lightened.

Use of Removable Camouflage Spray Paint on the SWS and Equipment

The sniper weapon should be painted with a removable paint ("Bow Flage") so that the colors can be changed to suit different vegetation and changing seasons. Bow-Flage spray paint will not affect the accuracy or performance of the weapon; however, care must be taken when applying this paint. Bow-Flage should not contact the lens of optical equipment, the bore of the weapon, the chamber, the face of the bolt, the trigger area, or the adjustment knobs of the telescope. Bow-Flage is easily removed with Bow-Flage remover or Shooters Choice cleaning solvent, but it will not damage the weapon to be stored with the paint on it.

Field-Expedient Camouflage

The sniper team may have to use field-expedient camouflage if other methods are not available. Instead of camouflage sticks or face paint, the team may use charcoal, walnut stain, mud, or whatever works. The team will not use oil or grease due to the strong odor. Natural vegetation can be attached to the body by boot bands or rubber bands or by cutting holes in the uniform.

4-2. COVER AND CONCEALMENT

The proper understanding and application of the principles of covar and conceelment used with the proper application of camouflage protects the aniper team from enemy observation.

Cover

Covar is nturs1 or artificial protection from the fire of enemy waspons Natural cover (ravinea, hollows, reverse slopes) and ertificial cover (fighting positiona, trenchas, wells) protects the aniper taem from flat trajectory fires snd psrtly protecta it from high-angle firea and the effects of nuciear explosions. Even the smallest depression or foid in the ground msy provide aome cover when tha taam neads it most. A 6-inch depreaaion, properly usad, may provida anough cover to save the aniper team under fire. It muat alwsya look for and take advantage of all covar tha terrain offars. By combining thia habit with proper movament techniques, the taam can protact itseif from enemy fire. To get protection from enemy fire whan moving, it usea routea that put covar between itself and tha placaa where the enemy ia known or thought to ba. Tha team uaaa naturai and artificiai cover to keap the anamy from saaing snd firing at it.

Concealment

Concaalment is natural or artificial protection from anamy obaarvation. Tha aurroundinga may provids nstural oonoaalmant that nsads no changa bafors use (buahea, graaa, and shadows). The aniper taam crastaa artificial concealment from matariala, auch aa burlap snd camouflaga nats, or it can move natural matariala (bushss, laavaa, and grass) from thair original location. Tha aniper taam muat conaider tha effacta of tha changa of aaaaons on tha concealmant provided by both naturai and artificial matariala.

Tha principlaa of concealment includa the foliowing:

o Avoid unneceaaary movement. Remain atill--movemant attracts sttention. Tha sniper team'a poaition may be concaalad whan it remaina atill, yet easiiy detected if it movas. This movement against s stationary background makas the tasm stand out clearly. Whan the team muat change poaitions, it moves carefully over s concealed routa to the new poaition, prefarebly during limited viaibility. It movea inchea at a time, slowly and cautiouaiy, alwsys scanning ahead for the next position.

o Uae sll svsilable concaalment:

* Background. Background ia importsnt; the aniper teem must bland with it to prevent detaction. The treea, buahes, grass, earth, and man-mada structurea that form the background vary in color and eppasrsnce. Thia makes it poasible for the team to blend in with them. The team aalacts trees or buahes to blend with

the uniform and to absorb the figure outline. It must always assume that its area is under observation.

* Shadows. The sniper team in the open stands out clearly, but the sniper team in the shadows is difficult to see. Shadows exist under most conditions, day and night. A sniper team should never fire from the edge of a wood line; it should fire from a position inside the wood line (in the shade or shadows provided by the tree tops).

o Stay low to observe. A low silhouette makes it difficult for the enemy to see a sniper team. Therefore, the team observes from a crouch, a squat, or a prone position.

o Expose nothing that shines. Reflection of light on a shiny surface instantly attracts attention and can be seen from great distances. The sniper uncovers his rifle scope only when indexing and reducing a target. He uses optics cautiously in bright sunshine because of the reflections they cause.

o Avoid skylining. Figures on the skyline can be seen from a great distance, even at night, because a dark outline stands out against the lighter sky. The silhouette formed by the body makes a good target.

o Alter familiar outlines. Military equipment and the human body are familiar outlines to the enemy. The sniper team alters or disguises these revealing shapes by using the ghillie suit or outer smock that is covered with irregular patterns of garnish. The team must alter its outline from the head to the soles of the boots.

o Keep quiet. Noise, such as talking, can be picked up by enemy patrols or observation posts. The team silence gear before a mission so that it makes no sound when it walks or runs.

4-3. INDIVIDUAL AND TEAM MOVEMENT

In many cases the success of a sniper's mission will depend upon his being able to close the range to his target, engage or observe the target, and withdraw without being detected. To do this, he must be able to move silently through different types of terrain.

Preparation for Movement

As with any mission, the sniper team must make preparations prior to movement. They must make a detailed study of large-scale maps and aerial photographs of the area, they must interview inhabitants and people who have been through the areas before, and they must review any other intelligence available about the area. Sand tables of the area of operations may be constructed to assist

in forming and rehearsing the plan. They must also select camouflage to suit the area. The sniper team must allow enough time for the selection of the proper camouflage, which should match the type of terrain the team will be moving through. Prior to movement, an inspection should be held for all personnel to ensure that all shiny equipment is toned down and that all gear is silenced. The sniper must ensure that only mission essential gear is taken along.

o Route selection. In selecting routes of movement, a sniper should try to avoid known enemy positions and obstacles, open areas, and areas believed to be under enemy observation. The sniper should select routes that make maximum use of cover and concealment; trails should never be used. Advantage should be taken of the more difficult terrain--swamps, dense woods, etc.

o Movement. The sniper team cannot afford to be seen at any time by anyone. Therefore, their movement will be slow and deliberate. The movement over any given distance will be considerably slower than infantry units. Stealth is a sniper's security.

Rules of Movement

When moving, the sniper team should always remember the following rules:

o Always assume that the area is under enemy observation.

o Move slowly. A sniper counts his movement progress by feet and inches.

o Do not cause the overhead movement of trees, bushes, or tall grasses by rubbing against them.

o Plan every movement and move in segments of the route at a time.

o Stop, look, and listen often.

o Move during disturbances such as gunfire, explosions, aircraft noise, wind, or anything that will distract the enemy's attention or conceal the team's movement.

Types of Movement

The sniper team will always move with caution; they will employ various methods of walking and crawling based upon the enemy threat and the speed of movement required.

o Walking. Walking is the fastest and easiest way to move when extreme silence is desired. It is also the most expedient form of individual sniper movement. It is used when threat is low and speed is important. The sniper walks in a crouch to maintain

a low profile with shadows and bushes so as not to be silhouetted (Figure 4-3-1). When walking, the sniper ensures that his footing is solid. He keeps his weight on one foot as he raises the other, being sure to clear all brush; then gently sets the moving foot down, toes first, and then the heel. Short steps are taken to maintain balance. The weapon is carried in line with the body by grasping the forward sling swivel. The muzzle is kept pointed down. At night, the weapon is held close to the body to free the other hand to feel for obstacles.

o Hands and knees crawl. This crawl is used when cover is adequate or silence is necessary. It is self-explanatory in that the sniper uses his hands and knees to crawl (Figure 4-3-2). The rifle is held in one hand close to the chest in line with the body or placed on the ground along the side of the body. The weight of the upper body is supported by the opposite arm. While supporting the rifle in one hand, the sniper picks a point ahead to position the opposite hand and slowly and quietly moves the hand into position. When moving the hand into position, the sniper may support the weight of his upper body on the opposite elbow. The sniper then alternately moves his hands forward, being careful not to make any noise. Leaves, twigs, and pebbles can be moved out of the way with the hand if absolute silence is required.

o High crawl. The high crawl is used when cover is more prevalent or when speed is required (Figure 4-3-3). The body is kept free of the ground and the weight rests on the forearms and the lower legs (shins). The rifle can either be carried as in the low crawl or cradled in the arms. Movement is made by alternately pulling with each arm and pushing with one leg. The sniper can alternate legs for pushing when cover is adequate. An alternate method is to pull with both arms and push with one leg. The sniper should ALWAYS keep in mind that the head and buttocks cannot be raised too high and the legs must not be allowed to make excessive noise when being dragged over brush and debris.

o Medium crawl. The medium crawl is used in fairly low cover (Figure 4-3-4). It is faster than the low crawl and less tiring to the body. The medium crawl is similar to the low crawl, except that one leg is cocked forward to push with. One leg is used until tired; then the other leg is used. However, the sniper must not alternate legs, as this causes the lower portion of the body to rise into the air.

o Low crawl. The sniper uses the low crawl when an enemy is near, when vegetation is sparse, or when moving in or out of position to fire or to observe (Figure 4-3-5). To low crawl, the sniper lies face down on the ground, legs together, feet flat on the ground, and arms to the front and fist on the ground. To carry the rifle, the sniper grasps the upper portion of the sling and lays the stock on the back of his hand or wrist, with the rifle lying on the inside of his body under one arm. The rifle can be

pushed forward ss the sniper moves. However, cere must be taken to ensure thst the muzzle does eot protrude into the air or stick into the ground. To move forward, the sniper extsnds his arms and pulls with his arms while pushing with his toes, being careful not to raise his heels or head. This type of movement is extremely slow and reguires practice to keep from using quick or jerky movements.

o Turning while crawling. It may be necessary to change direction or turn completely around while crswling. To execute a right turn, the sniper moves his upper body as far to the right ss possible and then moves hie left leg to the left as fsr ss possible. The right leg is then closed to the left leg. Thie will create a pivot-type movement (Figure 4-3-6). Left turns ere done in the opposite fashion.

o Beckwerd movement. The sniper moves backwards by reversing the crewling movement.

o Aeeuming the prone poeition. The eniper aesumes the prone poeition from e walk by etopping, tucking his rifle under his erm, end crouching elowly. Simultaneouely, hs fsels the ground with the free hend for e cleer epot. He then lowers his knsss, one at e time, to the ground. He ehifts hie weight to one knee end lifts end extends the free leg to the rear. The toes ere used to feel for e cleer epot. Rolliog onto that eide, he then lowers the reet of hie body into poeition.

o Night movemeot. Movemeot at oight is eaeentially the eame es movement during the dey, except thet it muet be elower end more deliberete becauee of the limited viaibility. The eniper hee to rely on the eeneee of touch end heering to e greeter extent. If et ell poeeible, the eniper ehould move under the cover of darknaee, fog, haze, rain, or high winds to conceal hie movement. Thie ie e eafety factor; however, it mekes the enemy herder to spot end epecific poeitione or lendmarke harder to locate.

Stalking

Stslking is the eniper'e art of moving unseen into e firing poeition within a renge that will ensure e first-round kill and then withdrswing undetscted. The stalk iecorporates all espects of field crsft and can only be effsctively lesrned by repested practice over various typee of ground.

o Reconneissance. The sniper should conduct e complete reconnaissance prior to his missioe. Seldom will e sniper have sn opportunity to view the ground. He must rely on maps and aerial photographs for his information. The seiper should address the following before etelking:

* Location, position, or target to be stelked.

* Cover end coocealment.

* Best possible firing poaition to engage targets.

* Best line of sdvsnce to stalk.

* Obatscles, whether nsturs1 or srtificial.

* Obaervstion points along the route.

* Known or auspected enemy locations.

* Method of movement throughout the mission.
* Withdrswsl route (to include method of movement).

o Conduct of the stalk.

* A sniper may lose his sense of direction whila atalking, particularly if he haa to crawl for any appraciabls diatance. Tha chancea of this happening csn be reduced if:

o A compsss, map, and sarial photograph ars uasd and the route, diraction, and diatance to varioua chackpointa ara thoroughly and accuratsly planned.

o A distinct landmark or two, or avsn a saries, hava baan mamorizad.

o Tha diraction of the wind and aun ara notad. Howavar, the anipar must bear in mind that over a long parad of tima tha wind diraction can changa and tha aun will change poaition.

o Tha aniper haa tha ability to uaa tarrain asaociation.

* Tha anipar muat be alert at all times. Any relaxstion on a atalk can lesd to carelessness, resulting in an unsucceasful miaaion snd sven death.

* Observation ahould be undertaken st periodic intervals. If the sniper is surpriaed or expoaed during the stslk, immediate resction is neceaaary. The sniper must decide whether to freeze or move quickly to the nesrast cover snd hide.

* The sniper must remember that diaturbed anımala or birds csn draw attantion to the area of approsch. If anımala sre slsrmed, the aniper should stop, wait, and lısten. Thair flight may indicate somaone's spprosch or call attentıon to the aniper's position. However, sdvantage ahould be taken of sny local disturbances or distractions that could ensble the sniper to move more quickly than would otherwise be possible. It should be emphaaized that such movemant includes s degree of risk, and when the snemy is close, risks should be svoıded.

* While halted, the sniper identifies his next position.

* When moving through tall grass, the sniper should occasionally make a slight change of direction to keep the grass from waving in an unnatural motion.

* The sniper should be aware of any changes in local cover, since such changes will usually require an alteration to his personal camouflage.

* When crossing roads or trails, look for a low spot or cross on the leading edge of a curve. Avoid cleared areas, steep slopes, and loose rocks. The sniper should never skyline himself.

o Night stalking.

Man is less adapted to stalking at night than during the day. He must use slower, more deliberate movement in order to occupy an observation post or a firing position. The principal differences between day stalking and night stalking are that at night:

* There is a degree of protection offered by the darkness against aimed enemy fire.

* While observation is still important, much more use is made of hearing, making silence vital.

* Cover is less important than background. The sniper should particularly avoid crests and skylines against which he may be silhouetted.

* Maintaining direction is much more difficult to achieve, which places greater emphasis on a thorough reconnaissance. A compass or knowledge of the stars may help.

<u>Silent Movement Techniques</u>

Stealthful movement is critical to sniper survival and mission success. This requires the sniper to learn the skills of: memorization of the ground and the surrounding terrain; silent and stealth movement; and movement over different terrain and various noise obstacles. The sniper must memorize the terrain, select a route, move, communicate using touch signals, and avoid or negotiate obstacles using stealth techniques. This is accomplished by:

o The sniper uses binoculars to observe the terrain to the front, simultaneously selecting a route of advance and memorizing the terrain

- The sniper partners plen eignals for different obstacles. Considerations are:
  - Finding the obsteclee.
  - Identifying the obstacles (berbed wire, explosivee, mines).
  - Negotiating the obstaclee. (Should the teem go around, over, or under the obstaclee?)
  - Clearing the obatecles. (Or getting ceught in the obstacle.)
  - Signeling partner. A signal muet be releyed to the sniper's partner.
- Stealth end eilent movement techniquee ere characterized by:
  - Cautious and deliberate movement.
  - Frequent halts to listen and obeerve.
  - No unnecessary movement.
  - Silent movement. All equipment is taped and paddad.
  - Looking where the next move is going to be made.
  - Clearing foliage or debris from the next position.
- Passage of obstacles involves:
  - Avoiding or by-passing noiee obstacles.
  - If noiee obstecles muet be moved through, checking the debrie and cleering looee noiee obstaclee from the peth.
  - Memorizing locatione of obstecles for night movement.
- The beeic elements of walking eteelthily ere:
  - Maintaining balance.
  - Shifting weight gredually from the rear foot to the front foot.
  - Moving the rear foot to the front, taking care to cleer brush, etc. The moving foot may be placed either heel first, toe firet, edge of foot firet, or flat on the ground

o To move through rubble and debris:

* Test the debris with the hand.

* Remove debris that will break.

* Move forward as quickly as practical and as quietly as possible.

* Putting the feet down flat-footed. This will reduce noise.

o Try to avoid moving through mud and muck. If it cannot be avoided, the boots should be wrapped with burlap rags or socks.

o Sand is noiseless to cross, so movement can be fairly fast.

o To move over an obstacle, the sniper keeps a low silhouette, ensuring that he does not brush or scrape against the obstacle, lowers himself silently on the other side, and moves away at a medium-slow pace.

o The sniper always maintains positive control of his weapon.

Detection Devices

The sniper must be constantly vigilent in his movements and acts to defeat enemy detection. These devices are:

o Passive and active light intensification devices. Beyond direct enemy observation, the sniper must be aware of enemy detection devices. The enemy may employ these devices, and the sniper may not know that he is under observation. Where there is the possibility that night vision devices are being used, the sniper can combat them by moving very slowly and staying very low to the ground. In this way his dark silhouette will be broken up by vegetation. Preferably, the sniper will move in dark shadows or tree lines that will obscure the enemy's vision. Also, moving in defilade through ground haze, fog, or rain will greatly benefit the sniper by helping him to remain undetected. Additionally, using the new infrared reflecting material (used in equipment netting) as a base for the ghillie suit will limit the enemy's infrared viewing capabilities.

o Sensors. Sensors are remote monitoring devices with seismic sensors, magnetic sensors, motion sensors, infrared sensors, or thermal sensors planted in the ground along likely avenues of advance or perimeters. These devices normally vary in sensitivity. They are triggered by vibration of the ground, metal, movement, breaking a beam of light, or heat within their area of influence. The sniper can move past these devices undetected only

by using the slowest and most careful movement without mistakes. He can help combat the effects of seismic devices by moving when other actions that will activate the devices, such as artillary fire, low-flying aircraft, rain, snow, or even a heavy wind, are in progress or, in some instances, moving without rhythm. Most other sensors can be defeated if the sniper knows their limitations and capabilities.

o Ground surveillance radars. Groud surveillance radars can detect troop or vehicle movemeat at an exteaded range, but only along its line of sight and only if the object is moving at a given speed or faster. It takes a well-trained individual to properly monitor the device. Saipers can combat the use of ground surveillance radare by moving in defilada, out of the direct line of sight of the aquipment, or slower than the radar can detact. Movement should be extremely slow and low to the ground, using natural objecta and vegetation to mask the movement.

o Thermal imagere. Thermal imagera era infrarad heat detectore that locate body beat. They may be usad to datect the aniper. Even a motionleee and camoufleged anipar could ba located by theee devicee. One poeaible way to confuee auch a datector would be to attach a epace blanket (Mylar) to the inside of tha camouflage auit. This would reflect the body heat inward and could poaaibly keep the aniper from being distinguished from the heat pattern of the eurrounding terrain. Thie would work baat when the temperature ia warm and the greeteet amount of radiant haat ia rieing from the ground.

<u>Selecting Lines of Advance</u>

Part of the aniper's miseion will be to enalyze tha terrain, aelect a good route to the terget, uee obsteclae (manmada and neturel) and terrain to their beet edvantage, and determine tha beat method of movement to arrive at hie terget. Once at the target eite, he muet be able to eelect firing poeitione and plan a atalk.

On the ground, the snipar looks for a route that will provide the best cover and concealment. Maximal use is made of low ground, dead space, and shadows. Open areas are evoided. Look for a route that will provide easy movement, yet will allow quiet movement at night. Select the route, thea choose the movement technique(s) that will allow undetected movement over that specific terrain.

Position aelectioa is criticel to mission success. Do not select a position that looks obvious aad ideal for a sniper. It will appear that way to the enemy. Select a position away from prominent terrain features of coatraating background. The position must give maximum cover and concealmant. When possible, an area is selected that has an obstecle (neturel or manmade) batween the sniper and the target.

Stalk plsnning involves map and ground reconnaissance, selection of a route to the objective, selection of the type of movement, notation of known or suspected enemy locstions, snd selection of a route of withdrawal. Movement differs in msny ways from that of the infantry squad. One of the most noticeable differences is the movement technique used by the sniper tesm. Movement by tesms must not be detected or even suspected by the enemy. Becsuse of this, a sniper team must msster individusl sniper movement techniques.

Snipar Taam Movamant and Navigation

Snipers ara employed in two-man teams consisting of one sniper snd one observer. Normally, the sniper csrries the sniper wespon system; the observer carries an M16/M203; and both have sidearms. Because of this lack of personnel and firepower, the sniper team csnnot afford to be detected by the enemy nor can it successfully mest the enemy in sustained engagements.

When possibls, ths sniper team should havs a security slemsnt (squad/platoon) attachsd. Ths security element allows ths team to reaoh its arsa of opsrations quicker snd safer than csn bs sxpacted by ths team opsrating alons. Plus, ths security slsmsnt providss ths tsam a rsaction forcs should ths team be dstscted.

Snipsrs uss ths following guidelinss when attsching a security elsmsnt:

- Ths security slemsnt leadsr is in chargs of the tsam whils it is attachsd.
- Sniper tesms slweys sppsar ss sn intsgral part of the elsmsnt.
- Sniper tesms wear the sams uniform as ths slement msmbers.
- Snipsr teams maintain proper intarvals and positions in sll formations.
- The sniper wespon system is carried in line and close to the body, hiding its outline snd berrel length.
- All equipment that is unique to sniper taams is concesled from view (optics, ghillie suits, and so forth).
- Once in the area of operation, tha sniper team sepsrstes from tha security element and opersts alone. Two exsmples of sniper teams separating from security elements are ss follows:

  * The security slement provides security while the tesm prepares for its operstion.

- The team dons the ghillie suits and camouflages itself and its equipment (if mission required).

- The team ensures that all equipment is secure and caches any nonessential equipment (if mission required).

- Once the team is prepared, it assumes a concealed position, and the security element departs the area.

- Once the security element has departed, the team waits in position long enough to ensure neither itself nor the security element have been compromised. Then, the team moves to its tentative position.

* The security element conducts a short security halt at the separation point. The sniper team members halt, ensuring they have good available concealment and know each other's location. The security element then proceeds, leaving the sniper team in place. The sniper team remains in position until the security element is clear of the area. The team then organizes itself as required by the mission and moves on to its tentative position. This type of separation also works well in MOUT situations.

When selecting routes, the sniper team must remember its strengths and weaknesses. The following guidelines should be used when selecting routes:

- Avoid known enemy positions and obstacles.

- Seek terrain that offers the best cover and concealment.

- Take advantage of difficult terrain (swamps, dense woods, and so forth).

- Avoid natural lines of drift.

- Do not use trails, roads, or footpaths.

- Avoid built-up or populated areas.

- Avoid areas of heavy enemy guerrilla activity.

- Avoid areas between opposing forces in contact with each other.

When the sniper team moves, it must always assume its area is under enemy observation. Because of this and the size of the team with the small amount of firepower it has, the team can use only one type of formation--the sniper movement formation. Characteristics of the formation are as follows:

- The observer is the point man; the sniper follows.

- The observer's sector of security is 8 o'clock to 4 o'clock; the sniper's sector of security is 2 o'clock to 10 o'clock (overlapping).

- Visual contact must be maintained, even when lying on the ground.

- An interval of no more than 20 meters is maintained.

- The sniper reacts to the point man's actions.

- The team leader designates the movement techniques and routes used.

- The team leader designates rally points.

- The team moves by using individual bounding techniques. They can move by successive bounds or alternating bounds.

- Danger areas are crossed by changing movement techniques.

Sniper Team Immediate Action Drills

A sniper team must never become decisively engaged with the enemy. The team must rehearse immediate action drills to the extent that they become a natural and immediate reaction should they make unexpected contact with the enemy. Examples of such actions are as follows:

Visual contact. If the sniper team sees the enemy and the enemy does not see the team, the team freezes. If the team has time, it will do the following:

- Assume the best covered and concealed position.

- Remain in position until the enemy has passed.

NOTE: The team will not initiate contact.

Ambush. In an ambush, the sniper team's objective is to break contact immediately. One example of this involves performing the following:

- The observer delivers rapid fire on the enemy.

- The sniper throws smoke grenades between the observer and the enemy.

- The sniper delivers well-aimed shots at the most threatening targets until smoke covers the area.

- The observer then throws fragmentation grenades and withdraws toward the sniper, ensuring he does not mask the sniper's fire.

- The team moves to a location where the enemy cannot observe or place direct fire on it.

- If contact cannot be broken, the sniper calls for indirect fires/security element (if attached).

- If team members get separated, they should either link up at the objective rally point or return to the next-to-last designated en route rally point. This will depend upon the team SOP.

Indirect fire. When reacting to indirect fires, the team must move out of the area as quickly as possible. This sudden movement can result in the team's exact location and direction being pinpointed. Therefore, the team must not only react to indirect fire but also take actions to conceal its movement once it is out of the impact area.

- The team leader moves the team out of the impact area using the quickest route by giving the direction and distance (clock method).

- Both members move out of the impact area the designated distance and direction.

- The team leader then moves the team farther away from the impact area by using the most direct concealed route. They continue the mission using an alternate route.

- If the team members get separated, they should either linkup at the the objective rally point or return to the next-to-last designated en route rally point.

Air attack.

- Team members assume the best available covered and concealed positions.

- Between passes of aircraft, team members move to a position that offers better cover and concealment.

- The team does not engage the aircraft.

- Team members remain in position until the attacking aircraft departs.

- If team members get separated, they should linkup at the objective rally point or return to the next-to-last designated en route rally point.

Navigational Aids

To aid the sniper team in navigation, the team should memorize the route by studying maps, aerial photos, or sketches. The team notes distinctive features (hills, streams, roads) and its location in relation to the route. It plans an alternate route in case the primary route cannot be used. It plans an offset to circumvent known obstacles to movement. The team uses terrain countdown, which involves memorizing terrain features from the start to the objective, to maintain the route. During the mission, the sniper team mentally counts each terrain feature, thus ensuring it maintains the proper route.

The sniper team maintains orientation at all times. As it moves, it observes the terrain carefully and mentally checks off the distinctive features noted in the planning and study of the route.

Many aids are available to ensure orientation:

- The location and direction of flow of principal streams.
- Hills, valleys, roads, and other peculiar terrain features.
- Railroad tracks, power lines, and other man-made objects.

4-4. TRACKING AND COUNTER-TRACKING

Tracking is the art of being able to follow a person or an animal by the signs that they leave during their movement. It is next to impossible to move cross country and not leave signs of one's passage. These signs, however, small, can be detected by a trained and experienced tracker. However, a person who is trained in tracking techniques can use deception drills that can minimize telltale signs and throw off or confuse trackers who are not well trained or who do not have the experience to spot the signs of deception.

As a tracker follows a trail, he builds a picture of the enemy in his mind by asking himself questions: How many persons am I following? What is their state of training? How are they equipped? Are they healthy? What is their state of morale? Do they know they are being followed? To answer these questions, the tracker uses available indicators--that is, signs that tell an action occurred at a specific time and place (Figure 4-4-1). By comparing indicators, the tracker obtains answers to his questions.

TRACKING

Tracking Signs

Signs are visible marks left by an individuel or an animal as it passes through an area. There are different categories of aigns:

o Ground eigns. Theae are aigos left below the knees. All ground signs are further divided into large and amall ground signs.

* Large ground aigns. Are caused by the movement of 10 or more individuals through the area.

* Small ground aigna. Are cauaed by the movement of one to nine individuals through the area.

o High aigna. Alao known aa top aigna. These are aigna lsft abovs the kneea. Theaa aigna ere also divided into large and small top aigna.

o Temporary aigne. Are thoae aigna that will avantually fade with time (a.g., a footpriot).

o Parmanent aigne. Thoae aigoa that requira weaka to fada or that will laava a mark foravar (a.g., broken branchea or chipped bark).

Tracking Indicators

Any aign the trackar diacovera can ba dafined by one of aix tracking indicatore: diaplacement, ataina, waathering, littar, camouflege, and immediata-uae intaliigance.

Diaplacement

Diaplacament takea placa when anything ia movad from ita original poaition. A wall-dafinad footprint in aoft, moiat ground ia a good axampla of diaplacemeot. The footgear or bare faat of tha paraon who left tha print diaplaced tha aoil by compraaaion, laaving an indantation in the ground. The tracker can atudy thia aign and datermine aeveral important facta. For exampla, a print left by worn footgaar or by bare feat may indicate lack of proper equipmant. Diaplacemeot can alao reault from clearing a trail by breaking or cutting through heavy vegetation with a machete--such traila are obvioua to the moat inexperienced tracker. Individuala may unconacioualy break more branchea aa they move behind aomeons who ie cutting. Diaplacement indicatora can aleo be made by peraona carrying haavy loads who atop to reat; prints made by box edgea can help to identify the load. When loada ars set down at a rest halt or cempaite, they uaually crush grasa and twiga. A reclining man can alao flatteo the vegetation.

Analyzing Footprints. Footprints can indicate direction, rate of movemsnt, number, and aex, and whether the individual know he ia being tracked.

o If footprints are deep and the pace is long, rapid movement is apparent. Extremely long strides and deep prints with toe prints deeper than heel prints indicate running (Figure 4-4-2).

o Prints that are deep, short, and widely spaced, with signs of scuffing or shuffling indicate the person who left the print is carrying a heavy load (Figure 4-4-3).

o If the party members realize they are being followed, they may try to hide their tracks. Persons walking backward (Figure 4-4-4) have a short, irregular stride. The prints have an unnaturally deep toe, and soil is displaced in the direction of movement.

o To determine the sex of a member of the party being followed (Figure 4-4-5), the tracker should study the size and position of the footprints. Women tend to be pigeon-toed, while men walk with their feet straight ahead or pointed slightly to the outside. Prints left by women are usually smaller and the stride is usually shorter than that taken by man.

Determining Key Prints. Normally, the last man in the file leaves the clearest footprints; these should be the key prints. The tracker cuts a stick to match the length of the prints and notches it to show the length and widest part of the sole. He can then study the angle of the key prints in relation to the direction of march. He looks for an identifying mark or feature, such as worn or frayed footgear, to identify the key prints. If the trail becomes vague, erased, or merges with another, the tracker can employ his stick-measuring device and identify the key prints with close study. This method helps him to stay on the trail. By using the box method, he can count up to 10 persons. There are two ways the tracker can employ the box method:

o The most accurate is to use the stride as a unit of measure (Figure 4-4-6) when determining key prints. The tracker uses these prints and the edges of the road or trail to box in an area to analyze.

o The tracker may also use the 36-inch box method (Figure 4-4-7) if key prints are not evident. To use the 36-inch box method, the tracker uses the edges of the road or trail as the sides of the box. He measures a cross section of the area 36 inches long, counting each indentation in the box and dividing by two. This method gives a close estimate of the number of individuals who made the prints; however, this system is not as accurate as the stride measurement.

Recognizing Other Signs of Displacement. Foliage, moss, vines, sticks, or rocks that are scuffed or snapped from their original position form valuable indicators. Broken dirt seals around rocks, mud or dirt moved to rocks or other natural debris,

and water moved onto the banks of e stream are alao good indicators. Vinea may be dragged, dew droplets displaced, or atones and aticks overturned to ahow a different color underneath. Grasa or other vegetation may be bent or broken in the direction of movement (Figure 4-4-8).

o The tracker inapecta all areas for bita of clothing, threada, or dirt from footgear than can be torn or can fall and be left on thorna, anaga, or the ground.

o Fluahed from their natural habitat, wild animala and birdn are another example of diaplecement. Cries of birda excited by unnatural movement ia an indicator; moving topa of tall graaa or bruah on a windleaa dey indicntea that eomeone ia moving the vegetetion.

o Changes in the normal life of insecte end apidera may indicatn that aomeona hne recently paeeed. Veluable cluea arn dia-turbed baaa, ant holea covered by aomeone moving over them, or torn apider wnbn. Spidera often apin weba acroae open areen, traila, or roeda to trap flying inepecta. If the trecked peraon doea not evoid thnae weba, he lnevea en indicetor to en obaervent trecker.

o If the peraon being followad triea to uae a atraam to cover hia trail, the trecker can atill follow aucenaafully. Algae and other water planta cen be diapleced by loat footing or by cerelean walking. Rocka cen be diapleced from their original poeition or ovarturned to indicete e lighter or darkar color on the oppoeite aida. The peraon entering or exiting e ntream creatae elide marka or footprinta, or acuffa the berk on roota or aticke (Figure 4-4-9). Normelly, e pereon or enimal eeeka the path of leaat reeietance; tharefore, whan aeerching the atream for an indication of deperturea, trackera will find aigna in opan areaa along the banke.

Stains

A atain occura when eny eubstance from one organiam or article ia ameared or depoaited on aomething else. The bast example of ataining ie blood from e profuaely bleeding wound. Bloodataine often appaar en spattera or dropa and ere not always on tha ground; they alao appear ameared on leaves or twiga of treea and buahea. The tracker can alao determine the aeriousness of the wound and how far the wounded person can move unaasiated. Thie process may lead the tracker to enemy bodiea or indicate where they have been carried.

By studying bloodstaina, the tracker can determine the wound'a location:

o If the blood aeems to be dripping ateadily, it probably came from a wound on the trunk.

o If the blood appears to be slung toward the front, rear, or aidea, the wound is probably in the extremity.

o Arterial wounds appear to pour blood at regular intervals as if poured from a pitcher. If the wound is veinous, the blood pours steadily.

o A lung wound deposits pink, bubbly, and frothy bloodstains.

o A bloodstain from a head wound appeare heavy, wet, and slimy.

o Abdominal wounda often mix blood with digeative juices so the deposit has an odor and ia light in color.

Any body fluida, euch aa urine, or feces, depoeited on the ground, traas, buahea, or rocka will leave a etain.

On a calm, claer day, leaves of buehea end small treee are generelly turned eo thet the derk top eida shows. However, when e man peesee through an arse snd dieturbe the leevee, he will generelly ceuse the lighter eide of the leaf to ehow. Thie ie eleo true with eome verietiee of greee. Thie ceueee en unnetural diecoloration of the area, which ie celled "ehine." Gress or leevee thet have been etepped on will hsve s bruiss on the lighter eide.

Stsining can aleo occur when muddy footgear is dragged over greee, stonee, end ehrube. Thue, etaining end dieplecament combine to indicate movement end direction. Cruehed leevee may etain rocky ground thst ie too hard to ehow footprinte. Roots, stonee, end vines mey be eteined where lesves or berriee sre cruehed by moving feet.

The trscker mey have difficulty in determining the differenca between etaining and diaplacement eince both terms can be applied to some indicatore. For example, muddied water mey indicete recent movement; dieplaced mud eleo ataina tha watar. Muddy footgear can etain stonee in streams, and algee can ba diaplaced from etones in staams and can atain other etonee or the benk. Muddy water collects in naw footprints in swampy ground; howover, the mud eettlee and the water cleera with time. Tha tracker can use this information to indicete time; normally, tha mud cleara in about one hour, although time variea with the terrain. Since muddied water travels with the current, it ia uaually beat to move downatream.

Weathering

Weathering either aids or hindsra the tracker. It elso affects indicators in certain weye eo thet the tracker can determine their relative ages. However, wind, snow, rain, or

sunlight can erase indicators entirely and hinder the tracker. The tracker should know how weathering affects soil, vegetation, and other indictors in his area. He cannot properly determine the age of indicators until he understands the effects that weathering has on trail signs.

By studying weathering effects on indicators, the tracker can determine the age of the sign. For example, when bloodstains are fresh, they are bright red. Air and sunlight first change blood to a deep ruby-red color, then to a dark brown crust when the moisture evaporates. Scuff marks on trees or bushes darken with time; sap oozes, then hardens when it makes contact with the air.

Weather greatly affects footprints (Figure 4-4-10). By carefully studying this weathering process, the tracker can estimate the age of the print. If particles of soil are just beginning to fall into the print, the tracker should become a stalker. If the edges of the print are dried and crusty, the prints are probably about one hour old. This process varies with terrain and is only a guide.

A light rain may round the edges of the print. By remembering when the last rain occurred, the tracker can place the print into a time frame. A heavy rain may erase all signs.

Trails exiting streams may appear weathered by rain due to water running from clothing or equipment into the tracks. This is especially true if the party exits the stream single file. Then, each person deposits water into the tracks. The existence of a wet, weathered trail slowly fading into a dry trail indicates the trail is fresh.

Wind dries out tracks and blows litter, sticks or leaves into prints. By recalling wind activity, the tracker may estimate the age of the tracks. For example, the tracker may reason "the wind is calm at the present but blew hard about an hour ago. These tracks have litter blown into them, so they must be over an hour old." However, he must be sure that the litter was blown into the prints and not crushed into them when the prints were made.

Wind affects sound and odors. If the wind is blowing down the trail (toward the tracker) sounds and odors may be carried to him, conversely, if the wind is blowing up the trail (away from the tracker), he must be extremely cautious since wind also carries sounds toward the enemy. The tracker can determine wind direction by dropping a handful of dust or dried grass from shoulder height. By pointing in the same direction the wind is blowing, the tracker can localize sounds by cupping his hands behind his ears and turning slowly. When sounds are loudest, the tracker is facing the origin.

In calm weather (no wind), air currents that may be too light to detect can carry sounds to the tracker. Air cools in the evening and moves downhill toward the valleys. If the tracker is moving uphill late in the day or night, air currents will probably be moving toward him if no other wind is blowing. As the morning sun warms the air in the valleys, it moves uphill. The tracker considers these factors when plotting patrol routes or other operations. If he keeps the wind in his face, sounds and odors will be carried to him from his objective or from the party being tracked.

The sun should also be considered by the tracker. It is difficult to fire directly into the sun, but if the tracker has the sun at his back and the wind in his face, he has a slight advantage.

Litter

Litter consists of anything not indigenous to the area that is left on the ground. A poorly trained or poorly disciplined unit moving over terrain is apt to leave a trail of litter. Unmistakable signs of recent movement are gum or candy wrappers, ration cans, cigarette butts, remains of fires, urine, human feces, and bloody bandages. Rain flattens or washes litter away and turns paper into pulp. Exposure to weather can cause ration cans to rust at the opened edge; then, the rust moves toward the center. The tracker must consider weather conditions when estimating the age of litter. He can use the least rain or strong wind as the basis for a time frame.

The sniper should also know the wildlife in the area, because even dumps, regardless of how well camouflaged they are, are a potential source of litter. This is due to the fact that many animals can find the dump and dig it up for food. The best policy you can follow is to take out with you everything you brought in.

Camouflage

Camouflage applies to tracking when the followed party employs techniques to baffle or slow the tracker--that is, walking backward to leave confusing prints, brushing out trails, and moving over rocky ground or through streams. This would indicate a trained adversary.

Immediate-Use Intelligence

The tracker combines all indicators and interprets what he has seen to form a composite picture for on-the-spot intelligence. For example, indicators may show contact is imminent and require extreme stealth.

The tracker avoids reporting his interpretations as facts. He reports what he has seen, rather than stating these things exist. There are many ways a tracker can interpret the sex and size of the

party, the load, and the type of equipment. Time frames can be determined by weathering effects on indicators.

Immediate-use intelligence is information about the enemy that can be used to gain surprise, to keep him off balance, or to keep him from escaping the area entirely. The commander may have many sources of intelligence: reports, documents, or prisoners of war. These sources can be combined to form indicators of the enemy's last location, future plans, and destination.

Tracking, however, gives the commander definite information on which to act immediately. For example, a unit may report there are no men of military age in a village. This information is of value only if it is combined with other information to make a composite enemy picture in the area. Therefore, a tracker who interprets trail signs and reports that he is 30 minutes behind a known enemy unit, moving north, and located at a specific location, gives the commander information on which he can act.

Dog-Tracker Teams

There are three types of tracker dogs:

- Visual dogs. Rely upon their acute vision.
- Search dogs. Are allowed to run free and search using airborne scents.
- Tracker dogs. Run on leashes and use ground scents.

Many myths surround the abilities and limitations of canine trackers. The first and perhaps greatest myth is that tracking involves only the dog's sense of smell. Canine tracking involves a team--a merging of man and dog. Dogs use both their eyes and nose; the tracker uses his eyes and knowledge of the quarry. Together, they create an effective team that maximizes their strengths and minimizes their weaknesses. The sniper team is not only trying to evade and outwit "just" a dog but also the dog's handler. The most common breed of dog used is the German Shepherd. These dogs are trained to respond independently to a variety of situations and threats. Good tracking dogs are a rare and difficult-to-replace asset.

A visual tracker assists the dog handlers in finding a track if the dog loses the trail. He can radio ahead to another tracker and give him an oral account of the track picture. A visual tracker is slower than dogs, because he must always use his powers of observation, which creates fatigue. His effectiveness is limited at night.

A misconception is that dogs can smell molecular-level deposits left by the quarry. While it is true that blood, oil, or linked trails of material can be followed, this is not the primary

scent that a dog tracks. Dogs smell microbes in the earth that are released from disturbed soil. The trail has no innate smell of a specific quarry, although trails do vary depending on the size and number of the quarry. For example, a scent is like the wake a ship leaves in the ocean, but no part of the ship is left in the wake. It is the white, foamy, disturbed water that is the trail. This is entirely different from a point smell of the quarry such as sweat, urine, cigarette smoke, and so forth. The same training that makes tracking dogs adept at tracking a scent trail applies to finding a point smell.

Smelling is a highly complex process and many variables affect it. The most important element in tracking is "living" ground such as earth and grass that has living microbes in it and are disturbed by the quarry's passage. Artificial surfaces (concrete and macadam) and mainly inorganic surfaces (stone) provide little or no living microbes to form a scent track.

A dog builds a scent picture of the person that he is tracking. Scent is short lived, and its life span is dependent upon the weather and the area that the person last passed through. The sun and the wind, as well as time, destroy the scent. There are both airborne and ground scents. Airborne scents can be blown away within minutes or a few hours. Ground scents can last as long as 48 hours under ideal conditions.

Wind and moisture are other major variables that affect tracking. Foggy and drizzly weather that keeps the ground moist is best. Too much rain can wash a trail away; depending on the strength of the trail, it takes persistent, hard rain to erase a scent trail. Usually, the scent is not washed away but only sealed beneath a layer of ground water. A short, violent rainfall could deposit enough water to seal the scent track, but after the rain stops and the water layer evaporates, the microbe trail would again be detectable by dogs. Hard, dry ground releases the fewest microbes and is the most difficult terrain for dogs to track on. A dog may also have difficulty following a trail on a beach or dusty path, but his human tracker could easily follow the footprints visually. Snipers must always remember they are being tracked by a man and dog team.

Wind strength and direction are important factors in tracking. Basically, strong wind inhibits tracking a scent trail but makes it easier for a dog to find a point scent source--like a hide. A general rule is that a dog can smell a man-size source downwind out to 50 meters and a group-size source--a hide--out to 200 meters under ideal conditions. Upwind, a source 1 meter away could be missed.

Wind Direction -->

Wind Speed: Still Windy

D--X--------D-------------D

Distance: 1 meter 30 to 50 meters Maximum 150 to 200 meters

D = Dog Teem
X = Sniper/Sniper Team

A strong wind diaperses microbes thet erise from the ground, hindering s dog's ebility to follow a trail. However, a strong wind incrsaaaa the eize of s poiat sceat, helping a dog to find the target in en eree eeerch.

An inflexible rule for the life of s scent trail cannot be providad. In West Germany, ths trsckers rate thair chence of following e treil that is more thsa three dsye old es negligible. Terrein, weether, end the seasitivity of the tracking dog ere eome of ths meny veriables thst affect the ecent trail. A point small will leet ee long ee the terget emits odore.

While doga ere mainly ecsnt huntere, they elso heve good ehort-renge vieion. Doge ers color blind end do not heve good dietence vieion (cemouflege works extremely well egeinet doga); they can, however, detect elight movemente. Dogs eleo have e phenomenel eenee of heering, extending fer beyond humen norme in both the frequency renge end in eeneitivity. Doge use emell to epproximete e terget, end then rely on eound and movement to pinpoint thet terget.

Although doge heve tremendoue detection ebilitiee, they eleo heve limitetione. Following e ecent treil ie the moet difficult teek e trecking dog cen perform. The level of affort ie eo intenee thet moet doga cennot work longer then 20 to 30 minutee et e time, followed by e 10-to-20 minute reet. Dogs cen perform thie cycle no more than fiva or eix timee in sn 24-hour period before reeching complete exheuetion. The efficiency of the eearch eleo decraeses ea the dog tires. In wartime, the eituetion will force the meximum from men end equipment, but times should remain conetsnt for dog endurence. In wer or pesce, doga elweys give 100 percent effort; they enjoy trecking. If the enipers keep moving end etsy out of the detection renge of the human handlere, then they could outleat the dog-ecent treckers.

When looking for saiper teams, trsckers mainly use woodline aweepa end eree sesrchea. A woodline sweep consiats of walking the dog upwind of a suspected woodliae or brush line--the key is upwind. If the wind ie blowiag through the wooda end out of the woodline, trackera move 50 to 100 metera inside s wooded arae to eweep the wood's edge. Since woodliae sweeps tend to be leee epecific, treckera perform them fsster. An aree search is used when e team'a locetion ia specific such sa s small wooded eraa or block of houaes. The aearch eree is cordoned off, if possible, end

the dog-tracker teams are brought on line, about 25 to 150 meters spart, depending on terrain and visibility. The handlers then advance, each moving their dogs through a specific corridor. The handler controls the dog entirely with voice command and geatures. He remains undercover, directing the dog in a search pattern or to a likely terget eree. The search line moves forward with each dog dashing back and forth in aaaigned aectors.

Tschniguss to Defest Dog-Trscker Tsams

While dog end handler trecking teams are a potent thraat, there ere counters eveilable to the sniper team. Aa alwaya, the best defenses are besic infentry techniquea: good camouflage and light, noiae, and traah discipline. Dogs find a team either by datecting a trail or by a point source such es human waste odors at the hide eite. It is critical to try to obscure or limit traile around the hide, eepecially along the woodlina or sres closeat to the team'e terget sree. Surveillence targets are usually major axes of edvance. "Trolling the woodlinss" along likaly-looking roede or intsresctione ie e favorite tactic of dog/trecksr tsams. When moving into e target eree, the eniper teem ehould teke the following countermeaeures:

o Remain ee fer ewey from the target arae ee ths situetion ellowe.

o Never eeteblish e poeition et the edge of cover end conceelment neereet the target erea.

o Minimize the treck. Try to epproech ths position eree on herd, dry ground or elong e etreem or river.

o Urinete in e hole end cover it up. Never urinete in exactly the eems spot.

o Deeply bury fecel matter. If the duretion of the miseion permite, usa MRE bege sealed with tape end teke it with you.

o Never emoke.

o Cerry all traah until it can be buried eleewhere.

o Surround the hide with a 3- to 5-cm band of motor oil to maak odor; elthough lese effective but essier to csrry, gsrlic may ba used. A dead animal can alao be used to mesk smell, slthough it msy sttract unwanted canine attantion.

Whan doga ars being used against a sniper team, they uae other odors left behind or around the team to find it. Sweat from exertion or fesr is one of theae. Wet clothing or material from damp environments holds in the ecent. Soep or deodorant used prior to infiltration helps the dogs to find the team. Foreign odors, such as oils, preservetives, polish, and petroleum products, also

aid the dogs. The sniper should ensure to change his diet to that of the local inhabitants prior to infiltration.

When the sniper team first arrives into its area of operations, it is best to move initially in a direction that is from 90 to 170 degrees away from the objective. Objects or items of clothing not belonging to any of the team members should be carried into the area of operations in a plastic bag. Once the team is on the ground, it should drop this item of clothing or piece of cloth out of the bag and leave it on a back trail when the team first starts moving. This can confuse a dog long enough to give the team more of a head start. Also, if dogs are brought in late, the team's scent will be very faint, while this scent will still be strong.

While traveling, the team should try to avoid heavily foliaged areas, as these areas hold the scent longer. Periodically, when the situation permits, move across an open area that the sun shines on during the day which has the potential of being windswept. The wind moves the scent and will eventually blow it away; the sun destroys scent very rapidly.

When the situation permits, make changes in direction at the open points of terrain to force the dog to cast for a scent.

If dogs are very close behind, moving through water does not confuse them, as scent will be hanging in the air above the water. Moving through water will only slow the team down. Also, throwing CS gas to the rear or using blood and spice mixtures or any other concoctions will prevent a dog from smelling the team's scent, but it will not be effective on a trained tracker dog. At the first sign of the substance the dog will avoid the area.

While a dog will not be confused by water if he is close, running water, such as a rapidly moving stream, will confuse a dog if he is several hours behind. However, areas with foliage, stagnant air, and little sunlight will hold scent longer. Therefore, swampy areas should be avoided.

Move through areas that have been frequently traveled by other people, as this will confuse the team's scent picture to the dog.

Team members should split up from time to time to confuse the dogs. The best place for this is in areas frequently traveled by indigenous personnel.

If a dog tracker team is on the team's trail, the team should not run, as this will cause the scent to become stronger. The team may attempt to wear out the dog handler and confuse the dog, but should always be on the lookout for a good ambush site that the team can fishhook into. If it becomes necessary to ambush the tracking party, fishhook into the ambush site and kill or wound the handler, NOT the dog. Tracker dogs are trained with their handler,

and a trained tracker dog will protect his wounded handler. This has the potential of allowing the team to move off and away from the area while the rest of the tracking party tries to give assistance to the handler. Also, that dog will not work well with anyone other than his handler.

If a dog search team moves into the area, the team can employ several actions but should first check wind direction and strength. If the team is downwind of the estimated search area, the chances are minimal that the team's point smells will probably be detected. If upwind of the search area, the team should attempt to move downwind. Terrain and visibility dictate whether the team can move without being detected visually by the handlers. Remember, sweeps are not always conducted just outside of a woodline. Wind direction determines whether the sweep will be parallel to the outside or 50 to 100 meters inside the woodline.

The team has options if caught inside the search area of a line search. The handlers rely on radio communications and often do not have visual contact with each other. If the team has been generally localized through enemy radio detection-finding equipment, the search net will still be loose during the initial sweep. A sniper team has a small chance of hiding and escaping detection in deep brush or in woodpiles. Larger groups will almost certainly be found. Yet, the team may have the opportunity to eliminate the handler and to escape the search net.

The handler hides behind cover with the dog. He searches for movement and then sends the dog out in a straight line toward the front. Usually, when the dog has moved about 50 to 75 meters, the handler calls the dog back. The handler then moves slowly forward and always from covered position to covered position. Commands are by voice and gesture with a backup whistle to signal the dog to return. If a handler is eliminated or badly injured after he has released the dog, but before he has recalled it, the dog continues to randomly search out and away from the handler. The dog usually returns to another handler or to his former handler's last position within several minutes. This creates a gap from 25 to 150 meters wide in the search pattern. Response times by the other searchers tend to be fast. Given the high degree of radio "chatter", the injured handler will probably be quickly missed from the radio net. Killing the dog before the handler will probably delay discovery only by moments. Dogs are so reliable that if the dog does not return immediately, the handler knows something is wrong.

If the sniper does not have a firearm, human versus dog combat is a hazard. One dog can be dealt with relatively easily if a knife or large club is available. The sniper must keep low and strike upward using the wrist, never overhand. Dogs are quick and will try to strike the groin or legs. Most attack dogs are trained to go for the groin or throat. If alone and faced with two or more dogs, the sniper should flee the situation.

Dog-tracker teams are a potent threat to the sniper team While small and lightly armed, they can greatly increaae the area that a rear area security unit can aearch. Due to the dog-tracker team's effectiveness and its lack of firepower, a sniper team may be tempted to destroy such an "easy" targat. Whether a team ahould fight or run depends on the aituation and the team leader Eliminating or injuring the dog-tracker taam only confirms to threat security forces that thara is a hoatile team operating in the area. The techniques for attacking a dog-tracker team should be used only in extreme aituationa or aa a laat measure.

COUNTERTRACKING

There are two typaa of human trackera: combat trackers and professional trackers. Combat trackera look ahaad for aigna and do not nacessarily look for each individual sign. Professional trackers go from sign to sign. If they cannot find any sign, they will atop and aearch till they find ona. The only way to lose a trainad profaaaionsl tracker is to fishhook into an araa and then ambuah him.

If an anamy trackar finda tracka of two man, this talls him that a highly trainad spaciality taam may ba oparating in hia araa. However, a knowladga of countartracking enables the sniper taam to survive by ramaining undatactad.

As with the dogs, to confuaa the combat tracksr and throw him off tha track, tha aniper alwaya atart his movament away from his objactiva. Travel in a atraight lina for about an hour and than changa diractiona. This will cauae tha tracksr to caat in diffarant diractiona to find the track.

Evasion

Evaaion of the tracker or pursuit taam is a difficult taak that requirea the uae of immedista-action drills mostly designed to counter tha thraat. A taam akilled in tracking tachniquaa can aucceaafully employ deception drills to minimiza signa that the enemy can use against them. However, it is vary difficult for a person, eapecially a group, to move acroaa any area wthout leaving signa noticeable to the trained eye.

Camouflage

The followed party may employ most used and least used routes to cover its movement. It alao loaea travel time when trying to camouflage the trail.

o Most Used Routes. Movement on lightly-travelled aandy or aoft traila is easily trackad. Howevar, a peraon may try to confuse the tracker by moving on hard-surfaced, often-traveled roads or by merging with civiliana. These routes ahould be

carefully examined; if a well-defined approach leads to the enemy, it will probably be mined, ambushed, or covered by anipers.

o Least Used Routea. Least used routes avoid all man-made trails or roads snd confuse the tracker. These routes are normally magnetic azimuths between two points. However, the tracker can use the propar concepts to follow the party if he ia experiencad and persistent.

Reduction of Trail Signa. A soldier who tries to hide hia trail moves at reduced speed; therefore, the experienced tracker gains time. Common methods to reduce trail aigna are:

o Wrap footgear with rags or weer soft-soled sneakers, which mske footprinta rounded and leaa diatinctive.

o Brush out the treil. This csn rarely be done without leaving signs.

o Changs into footgear with a different tresd immedietely following s deceptive manauver.

o Wslk on hsrd or rocky ground.

Deception Techniques

Evsding s skilled end persistent enemy trscker requires skillfully executed msneuvers to deceive the trackar snd to csuss him to lose the treil. An enemy trecker csnnot be outrun by a sniper tesm that is csrrying equipment, becauee he trsvels light snd is escorted by enemy forces designed for pursuit. Ths size of the pursuing force dictstes the sniper teem's chsnces of success in employing smbush-type maneuvers. Sniper teems use some of the following techniques in immediete-ection drills end deception drills.

o Beckwerd Wslking. One of the most basic techniques is thst of wslking bsckwsrd (Figure 4-4-11) in tracks already made, and then atepping off tha treil onto terrein or objectivea thst leava little sign. Skillful uae of this msneuver csuaes the trecker to look in the wrong direction once he haa lost the trail.

o Large Tree. A good deception tactic ia to change diractions st large trees (Figure 4-4-12). To do this, ths aniper movss in any given direction end welks paat a large tree (12 inchea wida or larger) from 5 to 10 pacea. He cerefuily walks backward to the forward aide of the tree and makes e 90-degree change in the direction of travel, paasing the tree on ita forward side. This technique usea the tree ss e ecreen to hide the new trail from the pursuing tracker. A variation used neer e clear area ia aa follows. The aniper muat pass by the aide of the tree thst he wishes to change direction to on his next leg. He walks past the tree into a clear area for 75 to 100 meters end then walk backwards

to the tree. At this time he moves 90 degrees and passes on the side away from the tracker. This could possibly cause the tracker to follow his sign into the open area where, when he loses the track, he might possibly cast in the wrong direction for the track.

NOTE: By studying signs, an observant tracker can determine if an attempt is being made to confuse him. If the sniper team trys to lose the tracker by walking backward, footprints will be deepened at the toe and soil will be scuffed or dragged in the direction of movement. By following carefully, the tracker can normally find a turnaround point.

o "Cut the Corner". This deception is used when approaching a known road or trail. About 100 meters from the road, the team changes its direction of movement, either 45 degrees left or right. Once the road is reached, the team leaves a visible trail in the same direction of the deception for a short distance down the road. The tracker should believe that the team "cut the corner" to save time. The team backtracks on the trail to the point where it entered the road, and then it carefully moves down the road without leaving a good trail. Once the desired distance is achieved, the team changes direction and continues movement (Figure 4-4-13). A combination using the big tree method here would improve the effectiveness of this deception.

o "Slip the Stream". The sniper team uses this deception when approaching a known stream. It executes this method the same as the "cut the corner" maneuver. The team establishes the 45-degree deception maneuver upstream, then enters the stream. The team moves upstream to prevent floating debris and silt from compromising its direction of travel, and the team establishes false trails upstream if time permits. Then, it moves downstream to escape since crooks and streams gain tributaries that offer more escape alternatives (Figure 4-4-14). False exit points can also be used to further confuse. However, the sniper must be careful not to cause a false exit to give away his intended travel direction.

o Artic Circle. The team uses this deception in snow-covered terrain to escape pursuers or to hide a patrol base. It establishes a trail in a circle (Figure 4-4-15) as large as possible. The trail that starts on a road and returns to the same start point is effective. At some point along the circular trail, the team removes snowshoes (if used) and carefully steps off the trail, leaving one set of tracks. The large tree maneuver can be used to screen the trail. From the hide position, the team returns over the same steps and carefully fills them with snow one at a time. This technique is especially effective if it is snowing.

o Fishhook. The team uses this technique to double back (Figure 4-4-16) on its own trail in an overwatch position. It can observe the back trail for trackers or ambush pursuers. If the

purauing force is too large to be deatroyed, the team strivea to eliminate the trscker. It uses hit-snd-run tsctics, then moves to another ambuah poaition. The terrsin must be uaed to advantage.

Dog and visual trsckers are not infallible, and they can be confused with simple techniques snd clesr thinking. The sniper should not panic end try to outrun s dog or vlauel tracker. This only makes it eaaier for the tracking perty. The successful sniper keepa his head snd always plsns two steps ahead. Even if treckera are not in the sres, it is beet to slways use counter-tracking techniquea. This will prevent poasible grief in the long run. Remember: **THERE IS NO WAY TO HIDE A TRAIL FROM A PROFESSIONAL TRACKER!**

4-5. OBSERVATION AND TARGET DETECTION

The sniper'e mieaion requires that he deliver preciaion fire to aelected targets. Thie mieeion could not be sccompliahed without firet obaerving end detecting the targst. In the proceea of observing end detecting, the eniper teem is concerned with the eignificence of ths terget rether thsn the number of tergets. Ths eniper teem will record ths locetion identificetion of ell targets obeerved end then fire et them in e deecending order of importencs.

Use of Target Indicators

Ae diecueeed in the eection on camouflege end conceelment, ths eniper teem muet protect thsmselvee from terget indicetors thet could revsel their preeence to the enemy. The teem cen eleo uee theee terget indicetore to locate the enemy, ueing the procsee of obeervetion, which ie plenned end eyetemetic. The firet coneideretion ie toverd the diecovsry of eny immediste denger to the enipsr teem. The eniper teem begins with e "heety eeerch" of the sntire sree. Thie ie followed by e elow, delibsrete observetion, which ie celled e "detailed eeerch." As long ee the eniper teem remeins in poeition, they will meintein conetent obeervetion of the ares, ueing the hasty snd dstailed eeerch methods es the aituetion requiree.

Hasty Search

The haety search ie the firet phase of observing a terget sres. The observer conducts s haaty sesrch immedistely after the tesm occupies the firing position. This is e very rapid check for ensmy sctivity snd is conductsd in s very short time, about 10 seconds. The sesrch is carried out by making quick glances st epecific pointa, terrain festures, or other sreas that could conceal the enemy. The sniper should not sweep his eyea ecroas the terrein in one continuous movement; this will prevent him from detecting motion. The observer views the area cloaeat to the team's position first eince it could pose the most immediate threat. The observer then searchas ferther out until the entire terget area has been searched. The hasty sesrch is effective

because the eyes are sensitive to the slightest movement occurring within a wide arc of the object upon which they are focused. This is called "side vision" or "seeing out of the corner of the eye". The eye must be focused on a specific point to have this sensitivity. When the observer sees or suspects a target, he uses the binoculars or the M49 telescope for a detailed view of the suspected target area.

Detailed Search

After completing the hasty search, the designated observer then begins a systematic examination known as the detailed search using the overlapping strip method of search. Normally, the area nearest the sniper team offers the greatest potential danger. Therefore, the search should begin with the terrain nearest the sniper. The detailed search begins at either flank. The observer systematically searches the terrain to his front in a 180 degree arc, 50 meters in depth. After reaching the opposite flank, the observer searches the next area nearest his post. The search should be in overlapping strips of at least 10 meters to ensure complete coverage of the area as far out as the observer can see, usually of areas of interest that attracted the observer during the hasty search (Figure 4-5-1).

The observer must memorize the area as much as possible and make mental notes of prominent terrain features and other areas that may offer cover and concealment for the enemy. In this way, he becomes familiar with the terrain as he searches.

This cycle of a hasty search followed by a detailed search should be repeated three or four times. This allows the sniper team to become accustomed to the area; additionally, the team will look closer at various points with each consecutive pass over the area. After the initial searches, the observer should view the area, using a combination of both hasty and detailed searches. While the observer conducts the initial searches of the area, the sniper should record prominent features, reference points, and distances on a range card. The team members should alternate the task of observing the area about every 30 minutes. When searching or maintaining observation, the observer keeps movement of his head and body to a minimum. The observer should not expose his head any higher than is necessary to see the area being observed.

Maintaining Observation

Method. After completing his detailed search, the observer will be required to maintain observation of the area. To do this he should use a method similar to the hasty search. He should glance quickly at various points throughout the entire area, focusing his eyes on specific features.

Sequence. In maintaining observation of the area, the observer should devise a set sequence for searching to ensure coverage of all terrain. Since it is entirely possible that his

hasty search may fail to detect the enemy, the observer should periodically repeat a detailed search.

Why Objects Are Seen

The relative ease or difficulty in seeing objects depends upon several factors:

o Shape. Some objects can be recognized instantly by their shape, particularly if it contrasts with the background. Experience teaches people to associate an object with its shape or outline. At a distance, the outline of objects can be recognized well before the details of makeup can be determined. The human body and the equipment that a soldier carries are easily identified unless the outline has been altered. Areas of importance when considering shape during observation are:

* The clear-cut outline of a soldier and/or his equipment, either partially or fully exposed.

* Man-made objects, which have geometric shapes.

* Geometric shapes, which do not occur in nature on a large scale.

o Shadow. In sunlight an object or a man will cast a shadow that can give away his presence. Shadows may be more revealing that the object itself. Care must be taken to detect alterations of the natural shape of a shadow. Where light is excessively bright, shadows will look especially black. Contrast will be extreme, and in this exaggerated contrast the observer's eye cannot adjust to both areas simultaneously. This requires the observer to "isolate" the shadowed area from the bright sunlight so that his eye can adapt to the shadow.

o Silhouette. Any object silhouetted against a contrasting background is conspicuous. Any smooth, flat background, such as water, a field, or best of all, the sky, will cause an object to become well delineated. However, special care must be taken when searching areas with an uneven background, as it is more difficult to detect the silhouette of an object.

o Surface. If an object has a surface that contrasts with its surroundings, it becomes conspicuous. Objects with a smooth surface will reflect light and become more obvious than an object with a rough surface that casts shadows on itself. An extremely smooth object becomes shiny, and the reflections from a belt buckle, watch, or optical device can be seen over a mile away from the source. Any shine would attract the observer's attention.

o Spacing. Nature never places objects in a regular, equally spaced pattern. Only man uses rows and equal spacing.

o Siting. Objects that do not belong in the immediate surroundings are obvious and become readily detectable. This should arouse the observer's curiosity and cause him to investigate the area more thoroughly.

o Color. The greater the contrasting color, the more visible the object becomes. This is especially true when the color is not natural for that area. Color alone will usually not identify the object, but is often an aid in locating it.

o Movement. This final reason why things are seen will seldom reveal the identity of an object, but it is the most common reason an enemy's position is revealed. Even when all other indicators are absent, movement will give a position away. A stationary object may be impossible to see and a slow-moving object difficult to detect, but a quick or jerky movement will be seen.

Elements of Observation

Four elements in the process of observation include: awareness, understanding, recording, and response. Each of these elements may be construed as a separate process or as occurring at the same time.

Awareness. Awareness is being consciously attuned to a specific fact. A sniper team must always be aware of the surroundings and take nothing for granted. The team also considers certain elements that influence and distort awareness.

o An object's size and shape can be misinterpreted if viewed incompletely or inaccurately.

o Distractions can occur during observation.

o Active participation or degree of interest can diminish toward the event.

o Physical abilities (five senses) can be limited.

o Environmental changes can affect or occur at the time of observation.

o Imagination or perception can cause possible exaggerations or inaccuracies when reporting or recalling facts.

Understanding. Understanding is derived from education, training, practice, and experience. It enhances the sniper team's knowledge about what should be observed, broadens its ability to view and consider all factors, and aids in its evaluation of the information.

Recording. Recording is the ability to save and recall what was observed. Usually, the sniper team has mechanical aids, such

as writing utensils, logbooks, sketch kits, tape records, and cameras, to support the recording of events; however, the most accessible method is memory. The ability to record, retain, and recall depends on the team's mental capacity (and alertness) and ability to recognize what is essential to record. Added factors that affect recording include:

- o The amount of training and practice in observation.
- o Skill through experience.
- o Similarity of previous incidents.
- o Time interval between observing and recording.
- o The ability to understand or convey messages through oral or other communication.

Response. Response is the sniper team's action toward information. It may be as simple as recording events in a logbook, making a communications call, or firing a well-aimed shot.

NOTE: See Chapter 4-9 for discussion on the keep-in-memory (KIM) game.

Target Indication at Unknown Distances

Whenever possible, snipers should be deployed in pairs. Because of this, it is vital that they are able to recognize and direct each other to targets quickly and efficiently. In order to be able to recognize targets quickly, the sniper uses standard methods of indication, with slight variations to meet his individual needs.

There are three methods of indicating targets. These are, in order of simplicity, the direct method, the reference point method, and the clock ray method. Also, it is easier to recognize a target if the area of ground in which it is likely to appear is known. Such an area of ground is called an "arc of fire". An arc of fire is indicated in the following sequence:

- o The axis (i.e., the middle of the arc).
- o The left and right limits of the arc.
- o Reference points (prominent objects). These should be as permanent as possible (woods, mounds, etc.), a reasonable distance apart, and easy to identify. A specific point of the object is nominated and given a name and range (i.e., "mound-- bottom left corner--to be known as mound--range 400") the same as on your range card.

Direct Method. The direct method is used to indicate obvious targets. The range, where to look, and a description of the target are given. Terms used for where to look are:

- "Axis of arc" for targets on or very near the axis.
- "Left" or "right" for targets 90 degrees from the axis.
- "Slightly", "quarter", "half", or "three-quarters" and "left" or "right" for targets between the axis and the left or right limits.

Reference Point Method. To indicate less obvious targets, a reference point may be used together with the direct method, and perhaps the words "above" and "below" as well. For example:

- "300-mound (reference point--slightly right--small bush" (the target)).
- "200-mound (reference point--slightly right and below--gate" (target)).

Clock Ray Method. To indicate less obvious targets, a reference point target with a clock ray may be used. During indication it is imagined that there is a clock face standing up on the landscape with its center on the reference point. To indicate a target, the range, the reference point and whether the target is to the left or to the right of it, and the approximate hour on the clock face are given, i.e., "300-mound--right--4 o'clock--small bush".

When indicating targets, the following points must be considered:

- Range. This should be given as accurately as possible, though its main purpose is to give an indication of how far to look. The sniper alone should decide on his sight setting, and it may not necessarily be the same one as the indicated range.
- Corrections. This should be considered in conformance with the wind table. The observer's opinion of the wind allowance is given to assist the sniper in deciding which setting to use. Between the two opinions, fairly accurate range and windage settings should be decided, although with trained snipers little difference should exist.
- Detailed indication. This may require more detail than a normal indication; nevertheless, it should still be as brief and as clear as possible.

Mil measurements can be used along with the methods of indication to specify the distance between an object and the

reference point used (i.e., "mousd--referesce point; go left 50 mils; lone tree; bsse of tree; tsrget"). The mil scsle in binoculars csn sssist in accurste isdicatios, slthough occssionally the use of hsnd sngles will have to suffice. It is important that each sniper is conversssst with the ssgles subtended by the vsrious psrts of his hsnd when the srm is outstretched.

Sniper teams must slwsys be swsre of the difficulties thst can be csused when the observer snd the sniper sre observing through instruments with differest magsificstions snd fields of view (i.e., telescope, binoculsrs). If time asd concesiment sllow it, the observer snd the sniper should use the same viewing instrument, psrticulsrly if the mil scsle in the binoculsrs is being used, to give accurste messurements from s refersnce point.

It is necesesry thst both the observsr snd the firer know exsctly whst the other is doing snd what hs is ssying when locsting ths tsrgst. Any method thst is undsrstsndsble to both snipsrs snd is fsst to use ie sccsptsble. Thsy must uss short snd conciss words to locats ths tsrget. Esch must slwsys bs swsrs of whst ths other is doing so thst ths snipsr does not shoot bsfors ths obssrvsr is rssdy. Thsy must sst s routine thst both srs comfortsbls with. An sxsmpls of this dislogus would bs:

Obssrvsr: "600--half right, bsrn, right 50 mils, 2 o'clock, lsrgs rock, bottom lsft cornsr, tsrgst."

Firsr: "Tsrgst idsntifisd, rssdy."

Obssrvsr: "Hold on sdgs of right shouldsr" (wind corrsction).

Ths firsr should hsvs s round downrsngs within 1 second sftsr ths wind csll.

It is sxtrsmely importsnt that ths shootsr fires ss soon ss possibls sfter the wind csll to preclude ssy wind chsnge that could sffect the impsct of his bullet. If the wind does chsnge, then it is nscsssary for the observer to stop ths firing sequence snd give new wind rssdings to the shootsr. The shooter snd the observer must not be sfrsid to tslk to esch other, but they should keep everything ssid ss short and as concise ss possible.

Indexing Targets

There sre seversl ressoss why the sniper must hsve some system for remembering or indexing tsrget locations. The sniper msy wsnt to shoot st the highest priority tsrget first. This requires pstisnce. The sniper must be selsctive snd not shoot et e terget just to hsve s kill. Indiscriminste firing may slert more vslusble snd closer tsrgets. Engsgemest of s distsnt terget msy result in disclosure of the sniper post to s closer enemy.

Since several targets may be sighted at the same time, some system is needed to remember all of the locations. To remember the locations of targets, the observer uses aiming points and reference points and records this information on the sector sketch/range card and observer's log.

To index targets, the sniper team uses the prepared range card for a reference since it can greatly reduce the engagement time. When indexing a target to the sniper, the observer locates a prominent terrain feature near the target. He indicates this feature and any other information to the sniper to assist in finding the target. Information between team members varies with the situation. The observer may sound like an forward observer (FO) giving a call for fire to a fire direction center (FDC), depending on the condition of the battlefield and the total number of possible targets from which to choose.

Considerations:

o Exposure time. Moving targets may expose themselves for only a short time. The sniper team must be alert to note the points of disappearance of as many targets as possible before engaging any one of them. By doing so, the sniper team may be able to take several targets under fire in rapid succession.

o Number of targets. When the number is such that the sniper team is unable to remember and plot all target locations, the sniper team must concentrate only on the most important targets. By concentrating only on the most important targets, they will not fail to effectively locate and engage high priority targets and/or those targets that represent the greatest threat.

o Spacing. The greater the space interval between targets, the more difficult it is to note their movements. In such cases, the sniper team should accurately locate and engage the nearest target.

o Evaluating aiming points. Targets that disappear behind good aiming points are easily recorded and remembered. Targets with poor aiming points are easily lost. If two such targets are of equal value and threat to the team, the poor aiming point target should be engaged first, until the target with a good aiming point becomes a greater threat.

Target Selection

Snipers select targets according to their value. Certain enemy personnel and equipment can be listed as key targets, but their real worth must be decided by the sniper team in relation to the circumstances in which they are located.

Consideration in target selection. As stated in the discussion of recording targets, the choice of targets may be forced on

the sniper team. They may lose a rapidly moving target if they wait to identify it in detail, and they must consider any enemy threatening their position as an "extremely high value" target. When forced to choose a target, the sniper team will consider many factors:

o Certainty of target's identity. The sniper team must be reasonably certain that the target it is considering is the key target.

o Target effect on the enemy. The sniper team must consider what effect the elimination of the target will have on the enemy's fighting ability. It must determine that the target is the one available target that will cause the greatest harm to the enemy.

o Enemy reaction to sniper fire. The sniper team must consider what the enemy will do once the shot has been fired. The team must be prepared for such actions as immediate suppression by indirect fires and enemy sweeps of the area.

o Effect on the overall mission. The sniper team must consider how the engagement will affect the overall mission. The mission may be one of intelligence gathering for a certain period. Firing will not only alert the enemy to a team's presence, but it may also terminate the mission if the team has to move from its position as a result of the engagement.

o Probability of first-round hit. The sniper team must determine the chances of hitting the target with the first shot by considering the following:

* Distance to the target.

* Direction and velocity of the wind.

* Visibility of the target area.

* Amount of the target that is exposed.
* Amount of time the target is exposed.

* Speed and direction of target movement.

o Distance. Although the sniper may be capable of hitting a human target at a range of 900 meters, he should not risk such a distant shot without a special reason.

o Multiple targets. The sniper should carefully weigh the possible consequences of shooting at one of a number of targets, especially when the target cannot be identified in detail. The sniper may trade his life for an unimportant target by putting

himself in a position where he must fire repeatedly in self-defense.

o Equipment as targets. A well-placed shot can disable crew-served weapons, radios, vehicles, or other equipment. Such equipment may serve as "bait" and allow the sniper to make repeated engagements of crew members or radio operators while keeping the equipment idle, to be disabled at the sniper's convenience.

o Intelligence collection. Intelligence is an important collateral function of the sniper team. When in a location near to the enemy, the sniper team must be very judicious in its decision to fire. The sniper may interrupt a pattern of activity which, if observed longer, would allow the pair to report facts that would far outweigh the value of a kill. The well-trained sniper team will carefully evaluate such situations.

o Key target selection. A sniper selects targets according to their value. A target's real worth is determined by the sniper and the nature of his mission. Key personnel targets can be identified by: actions, mannerisms, positions within formations, rank or insignias, and/or equipment being worn or carried. Key targets are as follows:

* Snipers. Snipers are the number one target of a sniper team. The enemy sniper not only poses a threat to friendly forces, but he is also the natural enemy of the sniper. The fleeting nature of a sniper is reason enough to engage him because he may never be seen again.

* Dog-tracking teams. Dog-tracking teams pose a great threat to sniper teams and other special teams that may be working in the area. It is hard to fool a trained dog; therefore, the dog-tracking team must be stopped. When engaging a dog-tracking team, the sniper should engage the dog's handler first. This confuses the dog, and other tracking team members may not be able to control the dog without its handler.

* Scouts. Scouts are keen observers and provide valuable information about friendly units. This, along with their ability to control indirect fires make them dangerous on the battlefield.

* Officers (military and political). Officers are another key target of the sniper team. Losing key officers in some forces is such a major disruption to the operation that forces may not be able to coordinate for hours.

* Noncommissioned officers. Losing NCOs not only effects the operation of a unit but also affects the morale of lower ranking personnel.

* Vehicle commanders and drivers. Many vehicles are rendered useless without a commander or driver.

* Communications personnel. In some forces, only highly trained personnel know how to operate various types of radios. Eliminating these personnel can be a serious blow to the enemy's communication network.

* Weapon crews. Eliminating weapon crews reduces the amount and accuracy of enemy fire on friendly troops.

* Optics on vehicles. Personnel who are in closed vehicles are limited to viewing through optics. The sniper can blind a vehicle by damaging these optic systems.

* Communication and radar equipment. The right shot in the right place can completely ruin a tactically valuable radar or communication system. Also, only highly trained personnel may attempt to repair these systems in place. Eliminating these personnel may impair the enemy's ability to perform field repair.

* Weapon systems. Many high-technology weapons, especially computer-guided systems, can be rendered useless by one well-placed round in the guidance controller of the system.

Principles of Vision

In order to fully understand and accomplish the principles of training the eye, the sniper must know the capabilities and limitations of the eye. The parts of the eye correspond to the parts of the camera and react in much the same way as the camera (Figure 4-5-2). The eye has a lens much the same as a camera lens; however, the lens of the eye focuses automatically and much more rapidly than the lens of a camera. The eye also has a diaphragm, called the iris, that regulates the amount of light into the eye. This permits the individual to see in bright light or in dark shadows. Just as with the camera, the eye cannot accomplish both at the same time. The eye's film is the photoreceptor cells located on the back wall, or retina, of the eye. There are two types of cells:

o The cone cells are located in the central portion of the retina. They are for day vision, and enable one to distinguish color, shape, and sharp contrast. A great deal of light is required to activate the cone cells, so they are blind during periods of low light.

o The other cells are the rod cells. These cells are always active and surround the central portion of cone cells. They produce a substance called "visual purple". As the light level decreases, this substance increases the rod cells' ability to register light. However, visual purple is destroyed by light and requires time to build up. The rod cells are sensitive to

movement, and this causes the detection of movement out of "the corner of the eye" to register better than when looking directly at the movement.

Observation Techniques

Training of the eye requires training of the mind as well. The sniper's proficiency as an observer will come from a good mental attitude and a trained eye. As an observer, just like a hunter, the eye must be trained to notice little things, such as the bending of grass when there is no wind, the unnatural shape of a shadow, or the wisp of vapor in cold air. Even when the enemy cannot be seen, little things can give his location away, such as a window that is now open when it was closed before, a puff of smoke, signs of fresh soil, or disturbed undergrowth.

Learn the habits of the animals in the area, or watch the domestic animals. A chicken suddenly darting from behind a building; sheep, goats, or cows suddenly moving or just becoming more alert in a field; wild birds flying or becoming quiet; insects becoming quiet at night; or animals startled from their positions should alert the observer of possible enemy activity in his area.

The area of operation should be studied and memorized. Any change will alert the prepared mind to the possibility of the enemy. All changes should be closely inspected to determine the cause of the change.

An observer should keep certain rules in mind at all times while observing:

o Learn to look for objects that seem out of place. Almost every object in the wild is vertical; only man-made objects, such as a gun barrel, are horizontal.

o Learn to see things in the proper perspective at distances. Learn to see movement, color, shape, and contrast in miniature.

o Learn to look <u>through</u> vegetation, not <u>at</u> it. The observer should not be satisfied until he has seen as far as possible into the vegetation.

Due to the constant changing of clouds and the position of the sun, light is a constantly changing factor in observation. Always be ready to watch the changing contrast and shadows. An area that the sniper previously thought held no enemy may prove to be an enemy position when the light changes. When the sun is to the sniper's back, light will reflect from the enemy's optical devices. But beware, when the light changes and is to the front, the enemy will be able to see the light reflected from the sniper's optical devices.

When the sun is to the sniper's front, it is also more tiring for him to observe due to the light being in his eyes. He should be prepared to change personnel more frequently at this time if possible. If not, the use of some type of shading to cut down on the amount of light coming into the eyes will help.

Limited Visibility Techniques

Twilight is another time of light changes. The eye begins to produce visual purple, and the cons cells begin shutting down. Also, the iris opens more to let more light in. This causes the eye to constantly change focus, and consequently, this is more tiring for the eye. However, during twilight the enemy will usually become more careless, allowing an alert observer to spot that last change in position or that last cigarette before dark. The sniper should remember that this is not a time for him to become relaxed as well.

Limited visibility runs the gamut from bright moonlight to utter darkness. But no matter how bright the night is, the eye cannot function with daylight precision. For maximum effectiveness, an observer must apply the principles of night vision when training the eye.

o Night adaptation. Allow approximately 30 minutes for the eye to adjust.

o Off-center vision. Never look directly at an object at night. This will cause the object to disappear. When it reappears, it could appear to change shape or move.

o Scanning. When scanning, it is important that the eye stops movement for a few seconds during the scan to be able to see an object. When scanning around an object, the temptation to look directly at the object "just to make sure" should be resisted.

The following factors affect night vision:

o Lack of Vitamin A.

o Colds, headaches, fatigue, narcotics, alcohol, and heavy smoking.

o Exposure to bright light. This will destroy night vision for about 10 to 30 minutes, depending on the brightness and duration of the light.

Darkness blots out detail, so the eye must be trained to recognize objects by outline alone.

While some people can see better than others at night, everyone can use techniques to improve their vision at night.

o The eye can be trained to actually see all the detail possible at nighttime. When the sniper sees a tree, he actually sees the tree, not a faint outline that he thinks may be a tree.

o Open the iris. While the iris of the eye is basically automatic, the eye can be trained to open the iris up even more to gather more light, thus allowing more detail to be seen.

o Practice roofing. Roofing is silhouetting objects against a light background.

o Maneuver to catch the light. At night, noticeable light will only be in patches where it filters through the trees. The sniper must maneuver to place an object between his eyes and that patch of light.

o Lower the body. By lowering the body or even lying down, the sniper will be able to pick up more light and therefore see things that might otherwise go unnoticed.

Observation by Sound

Many times sound will warn the sniper long before the enemy is actually seen. Also, the sounds or lack of sounds from birds or animals may alert one to the possible presence of the enemy. It is therefore important to train the ears along with the eyes.

The ear nearest the origin of the sound will pick up the sound first and will hear it slightly louder than the other ear. This is what enables the sniper to detect the direction of the sound. However, if the sound reaches both ears at the same time and with the same intensity, the direction that the sound came from will not be discernable.

Sound also loses its intensity with distance traveled. The ears must be trained to become familiar with the different sounds at different distances so that the distance to the sound can be estimated. This would then give the sniper a general location of the sound.

The sniper must learn to actually hear all sounds. Most people rely on sight for most of their information. A trained sniper must learn to use his ears as well as his eyes. The observer must make a conscious effort to hear all of the sounds, so that when a sound changes or a new one occurs, he will be alerted to it.

By cupping his hand behind one ear, the sniper can increase his ability to hear and pinpoint the direction of a sound.

Target Location by the "Crack-thump" Method

Through training of the esr, the sniper will be sble to determine the spproximate location of e shot being fired. This is done by the "crsck-thump" method. When the sniper is being firsd at, he will hear two distinct sounds. One sound is the crack of the bullet ss it bresks the sound berrier ss it passes by his position. The other sound is the thump crested by the muzzle blast of ths wsapon being fired. The crsck-thump relationship is the time that passss between the two sounds. This time intervsl can be used to estimate the distance to the weapon being fired.

When the sniper hears the crsck, he does not look into the direction of the crack. This will give him s false location becauss the sonic wsves of the bullet strike objects perpendicular to the bullet's psth. The sniper would mistakenly look 90 degrees from the enemy's true position. The crsck should instead alert the sniper to start counting seconds.

The second sound hesrd is the thump of the wespon being fired. This is the enemy locstion. The time psssed in seconds is ths distsnce to the enemy. Sound trsvels et 340 meters per second st 15 degrees centigrsde. Therefore, hslf s second is spproximstely 300 meters, snd s full second 600 meters. It becomes essier to distinguish between the two sounds ss the distsnce incresses. By listening for the thump snd then looking in the direction of the thump, it is possible to see the flssh of s second round or the smoks of the wespon being fired. The speed of light is fsr grester thsn the speed of sound or of bullets. Remember thst the "crsck-thump" is s double edged sword that may be used sgsinst the sniper.

The speed, size, snd shape of the bullet will produce different sounds. Initislly, they will sound slike, but with prsctice the sniper will be sble to distinguish between different types of wespons. A 7.62x39mm bullet is just going subsonic st 600 mstsrs. Since the crsck-thump sounds differ from wespon to wespon, with prsctice the experienced sniper will be sble to distinguish enemy fire from friendly fire. The sniper should slwsys be keep in mind the thres objectivss of fire:

- To kill.
- To wound
- To suppress.

The crsck-thump method has the following limitations:

- Isolsting the crsck and thump is difficult when many shots sre being fired.
- Mountainous areas snd tsll buildings csuse schoss and mske this msthod ineffective.

To overcome these limitations, the innovative sniper team can do the following:

- Dummy Targets. During World War I, snipers used paper-mache or wooden heads to lure enemy snipers into firing. If the head was hit, they placed a pencil into the hole and noted the direction the pencil pointed. Today, the sniper team may use this technique with polystyrene plastic heads or mannequins dressed to resemble a soldier. The head is placed on a stick and slowly raised into the enemy's view while another team observes the area for muzzle blast or flash.

- Shot-Hole Analysis. Locating two or more shot holes in trees, walls, dummy heads, and so forth may make it possible to determine the direction of the shots. The team can use the dummy-head pencil method and triangulate on the enemy sniper's position. However, this method only works if all shots come from the same position.

Observation Device Use and Selection

The sniper team's success in selecting and engaging targets without betraying itself depends upon its powers of observation. In addition to the telescope, the sniper team has an observation telescope, binoculars, night vision sight, and night vision goggles to enhance its ability to observe and engage targets. Team members must relieve each other when using this equipment since prolonged use can cause eye fatigue, greatly reducing the effectiveness of observation. Periods of observation during daylight should be limited to 30 minutes followed by at least 15 minutes of rest. When using night vision devices, the observer should limit his initial period of viewing to 10 minutes followed by a 15-minute rest period. After several periods of viewing, he can extend the viewing period to 15 and then 20 minutes.

The M19 binoculars are the fastest and easiest aid to use when great magnification is not needed. The M19 binoculars also have a mil scale that can aid the sniper in judging sizes and distances. The M19 binoculars can also be used to observe at twilight by gathering more light than the naked eye. Using this reticle pattern aids the sniper in determining range and adjusting indirect fires. The sniper uses the binoculars for:

- Observing target areas.
- Observing enemy movement and positions.
- Identifying aircraft.
- Improving low-light level viewing.
- Estimating range.
- Calling for and adjusting indirect fires.

The M22 binoculars are the lateat in the inventory, but have several fetel flaws. The M22's flews ere directly ettributeble to ita enti-leser protective coetlng. This coating reflects light like a mirror, and ia e excellent target indicator. Also, this coeting reducea the emount of iight that is trensmitted throught the lena aystem end greatly reduces the observation capability of the eniper during dewn end dusk.

The M49 observation spotting telescope is 20x end can be uaed to diecern much more detail et e greeter distence than the binoculars or the eniper telescope. With good moonlight, targets up to 800 meters ewey cen be detected. However, the high magnificetion of the observetion scope decreases its field of view. Moreover, the terrein will not be in focus unless it is near the object being inepected. The observetion scope ehould be used only for the inapection of e specific point end not for observetion of en erea. More modern, and higher queiity spotting ecopes are eveilable in limited quentities. The sniper teem ehould research ths eveilebility of theee improved observetion devicee.

4-6. RANGE ESTIMATION

Renge eetimetion is the process of determining the distsnce between two pointe. In most sltustions, one of thess pointe will bs ths obsarver's position, while the other mey be the target or e prominent feature. The ebility to eccurately determine renge is the key ekill needed by the eniper to eccomplish his miesion. Range cen be determined by meesurlng or by eetimeting. Thsre ere three meln factors thst affect the eppesrance of objects whsn determining rsngs by eye.

Factors Affecting Range Estimation

o Neturs of the terget. Objects of rsguler outline, euch ss s house, will sppesr cloaer than one of irreguler outline, euch es e clump of trses. A target that contrests with its background will eppeer to be cloaer then it ectuelly ls A pertielly expoaed target will eppear more distant then it ectuelly is.

o Neture of the terrein.

* Obaerving over smooth terreln, such es aend, weter, or enow, ceuses the obaerver to undereetimate distence targeta. Objects will eppeer neerer than they really ere when the viewer is looking ecross e dspression, most of which is hidden from view. They will elso eppeer neerer when the viewer is looking downward from high ground They will elso appear neerer when the viewer ia looking down on e etreight, open road or elong reilroed trecks

* Aa the observer's eye follows the contour of the terrain, he tenda to overestimate distance targets. Objects will

appeer more diatant than they really are when the viewer is looking acroas a depreasion, all of which is vieible. They also appaar more distant than they really ere when the viewer is looking from low ground toward high ground and when the field of vision ia narrowly confined, auch as in twisted streets or on forest trails.

o Light conditions. The more clearly a target cen be aeen, the closer it will appear. A target viewed in full sunlight eppears to be closer than the same target viewed at dusk or dawn or through smoke, fog, or rain. The position of the sun in reletion to the target aleo affects the apparent range. When the eun is behind the viewer, the target appeers closer. When the sun appeers behind the target, the target ie more difficult to see and appeare farther away.

Units of Measure

o Human target. When reogiog oo e human target, the eniper may usa two differant mathode. The firet method is to renge on tha target ueing tha vertical croee heire end mil dots. Ths eacond method ie to usa the horizontal croee haire end mil dots.

* Vertical method. Thie ie the moet common mathod of range finding when ueiog the M3A. The eniper muet becoma very good at eetimating the haight of tha target in aithar metere or feet and inchee. Tha eniper hee tha option of ueing a 1-mater (heed to crotoh) targat frama or ueing tha antire targat (head to toa) ae the target frame. To uee tha varticel method, the croee heire are placad at either the feet, crotch, of top of tha head of the target. The mil value ie then reed for that tergat. The enipar muet determine the height of the tergat if he ie oot ueing tha 1-mater target frame. Since the telaecope ie cammad out in metere, tha height of the target muet be converted into metare. The range ie then calculatad uaing ths mil reletion formule. The estimation of the height of the target may be the moet importent factor in thia formula. An arror of 3 inchas on e 5-foot 9-inch terget that is actually 5 feat 6 inchae resulte in e 25 meter error at e reading of 4 mile.

Normel height of the human head is 10 inches.

$$\frac{\text{10 inchea x .0254 x 1,000}}{\text{Sizs of target in mils}} = \text{Renge to tsrget in metera}$$

This example may prove to be of specific uae when facing an anemy entrenched in bunkers or in dense vegetation.

* Horizontel method. The horizontal method is beaed upon a terget width of 19 inchee et the shoulders. Thia technique can be very eccurete out to ranges of 350 meters, end ia very effective in an urban environmeot. Beyond thia range it ia no longer effective. When using this method, the sniper muat be

sure to have on hand the chart that shows the various ranges for the mil dot readings obtained. A good rule of thumb is that if the target is smaller than 1 1/2 mils (322 meters), it is more accurate to use the vertical method.

The mil dots in the M3A are 3/4 MOA in diameter. Therefore, it is important to note where on the dots the bottom or the top of the target falls within the mil dot. The mil dots are spaced 1 mil from center to center.

o Building or Vehicle. When range finding on a building or a vehicle using a vertical scale, place the zero value at the lowest visible point; the top of the vehicle or building should be on the upper scale of numbers. Read the value at the highest point of the structure or vehicle.

When ranging on a vehicle or a structure using the horizontal scale, place the zero value at the far left of the structure and read the value located at the far right of the structure. When objects are at an oblique angle, the sniper may obtain ranges that are a little farther than they actually are. This is something to remember; this must be compensated for.

Range Estimation Techniques

Sniper Telescope

The M3A has a mil dot reticle and the mil relation formula is used for range determination. With the adjustable ranging feature of the ART I or ART II telescope, the sniper can accurately determine the range to any visible object or point out to 900 meters. The only requirement is that the sniper is familiar with the observed targets to determine or estimate a 30-inch portion of the target for the ART I or a 1-meter portion for the ART II. The sniper can then read the range/power index number opposite the white reference dot on the top of the telescope tube by the power ring; this will be the range in hundreds of meters. For example, the number 4 indicates a range of 400 meters. When the power ring stops between two reference numbers, the sniper merely interpolates. Using the telescope for range estimation is especially helpful when establishing known ranges for a range card or a reference mark. The sniper rifle's inherent stability helps to improve the accuracy of the measurements. Using the ranging feature of the sniping telescopes, the sniper may determine range by using the following:

o Personnel. The distance from the individual's head to his waist is normally 30 inches; from the top of his head to his groin is 1 meter (39.4 inches).

o Tanks. The distance from the ground line to the deck or from the deck to the turret top of a Soviet tank is approximately 30 inches.

o Vehiclea. The diatance from the ground line to the fender above the wheel ia approximately 30 inches. The diatance to the roofline ia approximately 3 1/2 to 4 feet.

o Trees. The width of the treea in the vicinity of the eniper will be a good indication of the width of the trees in the target area.

o Window fremes. The vertical length of a atendard freme is approximately 60 inchea. This diatance ia 1.5 meters by 2.0 meters in Europe.

NOTE: Through the proceaa of interpolation, the aniper can range on eny object of known eize. For example, the head of any individual will meaaure epproximately 12 inches. This can be ranged on by placing the heed between the top vertical etadia line and the reticle horizontal line, which repreeents 15 inchee for the ART I. The M3A hee e mil dot reticle. On thie teleecope e mil dot equele 3/4the of an MOA, while the epace between mil dots equele 1 mil or 3.375 MOA.

Mil Relation Formula

The mil reletion formule can eleo be ueed to determine rangee. The M3A rifle teleecope hes 10 mile verticel and horizontel meesurement between the heevy duplex reticle lines; the epece between each dot represente 1 mil. Military binoculare eleo heve e mil ecele in the left ocular eyepiece. By ueing the known meeeured eizee of objecte, the eniper can uee the mil relation formule to determine the range.

NOTE: The eize of objecte in metere yielda rangee in metere; the eize of objecte in yerde yielda renges in yerde. Other reletionehipe must eleo be underetood: 1 mil equele 3.375 MOA or 3.375 inchas et 100 yerda, 1 meter et 1000m, or epproximataly 1 yerd et 1,000 yerds.

The eniper uaee the following formula to determine the renge to the terget:

$$\text{Range to terget} = \frac{\text{Size of object in meters or yarde} \times 1000}{\text{Size of object in mila}}$$

Examples: 1) Object = 2 metera, Mile = 4 mila (aa meaaured in the M3A acope)

$$\frac{2 \times 1000}{4} = \frac{2000}{4} = 500 \text{ metera} = \text{range to target}$$

2) Object = 2 yards, Mils = 5 mila (as meaaured in the M3A acope)

$$\frac{2 \times 1000}{5} = \frac{2000}{5} = 400 \text{ yards} = \text{range to target}$$

NOTE: The distance to the target in yards must be converted to meters in order to correctly set the M3A's ballistic cam.

Once he understands the formula, the sniper must become proficient at estimating the actual height of the target in his scope. At longer ranges the measurements must be accurate to within 1/2 mil. Otherwise the data will be more than the 10 percent allowable error. The ability of the sniper team to accurately estimate the height of the target is the single most important factor in using this formula.

Calculating Ranges Using Military Binoculars

The range to a target can be calculated using the M3, M19, M22 binoculars, or any other optical device that has vertical and horizontal mil reticles.

- M3 Binoculars

The graduations between the numbers on the horizontal reference line are in 10-mil graduations.

The height of the vertical lines along the horizontal reference line is 2 1/2 mils.

The graduation of the horizontal reference lines on the left of the reticle is 5 mils (vertical) between the reference lines. These lines are also 5 mils long (horizontal).

The small horizontal lines located above the horizontal reference line in the center of the reticle are 5 mils apart (vertical) and are also 5 mils long (horizontal).

The vertical scale on the reticle is not to be used for range finding purposes.

- M19 Binoculars

The graduation between the number lines on the horizontal and the vertical lines on the reticle is 10 mils (Figure 4-6-1).

The total height of the vertical lines on the horizontal reference lines is 5 mils. These lines are further graduated 2 1/2 mils above the horizontal line and 2 1/2 mils below the line.

The total width of the horizontal lines on the vertical reference line is 5 mils. These lines are further graduated into 2 1/2 mils on the left side of the line and 2 1/2 mils on the right side of the vertical reference line.

- M22 Binoculars

The gradustion between the numbered lines on the horizontal and vertical reference lines is 10 mils.

There are 5 mils between s numbered graduation and the 2 1/2 mil tall line thet falls betwesn the numbered graduations

The velue of the longsr linss thet intersect the horizontal snd verticel linss on ths reticls is 5 mils.

The value of the shorter lines that intersect the horizontal and vertical reference lines on the reticle is 2 1/2 mils. These ere the lines that fall between the 5 mil lines.

Estimetion

There will be times, howevsr, whan the sniper must estimate the ranga to the target. This requires no equipment and can be accomplished without exposing the obeerver's position. There are two methods of eetimation that meet these requirements: the 100-mster unit-of-measure method snd the appearanca-of-objects method.

o The 100-Meter Unit-of-Measure Method

To use this method, the sniper must be able to visualize a distance of 100 meters on the ground. For ranges up to 500 meters, he determines the number of 100-meter increments between the two points that he wishes to measure. Beyond 500 meters, the sniper must select a point halfway to the target, determine the number of 100-meter increments of the halfway point, and then double this number to find ths range to ths target (Figure 4-6-2).

During training exercises, the sniper must become familiar with the effect that sloping ground has on the appearance of a 100-meter increment. Ground that slopes upward gives ths illusion of greater distance, and the obeervsr's tendency is to overestimate a 100-mater increment. Conversely, ground that slopes downward gives the illusion of shorter distance. In thie case, the sniper's tendency is to underestimate.

Proficiency in the 100-meter unit-of-measurs method requires constant practice. Throughout the treining in this technique, comperisons should continuously be made between the renge as determined by the sniper snd the sctual renge as determined by pacing or other mors accurate means of measurement. The best treining technique is to require the sniper to pace the range sfter he hes visually determined it. In this way he discovers the actusl range for himself, which makes a much greater impression than if he were simply told the correct range.

The greetest limitation of the 100-meter unit of measure is that its accuracy is diractly related to how much of tha terrain is visible at the greater ranges. This is particularly true at a range of 500 meters or more whsn the sniper can only see a portion of the ground between himself and the target. It becomes very

difficult to use the 100-meter unit-of-measure method of range determination with any degree of accuracy.

- The Appearance-of-Objects Method

The appearance-of-objects method is the means of determining range by the size and other characteristic details of the object in question. This is a common method of determining distances and is used by most people in their everyday living. For example, a motorist attempting to pass another car must judge the distance of on-coming vehicles based on his knowledge of how vehicles appear at various distances. Of course, in this example, the motorist is not interested in precise distances, but only that he has sufficient road space to safely pass the car in front of him. This same technique can be used by the sniper to determine ranges on the battlefield. If he knows the characteristic size and detail of personnal and equipment at known ranges, then he can compare these characteristics to similar objects at unknown ranges. When the characteristics match, so does the range.

To use the appearance-of-objects method with any degree of accuracy, the sniper must be thoroughly familiar with the characteristic details of objects as they appear at various ranges. For example, the sniper should study the appearance of a man when he is standing at a range of 100 meters. He fixes the man's appearance firmly in his mind, carefully noting details of size and characteristics of uniform and equipment. Next, he studies the same man in a kneeling position and then in a prone position. By comparing the appearance of these positions at known ranges from 100 to 500 meters, the sniper can establish a series of mental images that will help him determine range on unfamiliar terrain. Training should also be conducted in the appearance of other familiar objects such as weapons or vehicles. Because the successful use of this method depends upon visibility, anything that limits the visibility (such as weather, smoke, or darkness), will also limit the effectiveness of this method.

- Combination of Methods

Under proper conditions, either the 100-meter unit-of-measure method or the appearance-of-objects method is an effective way of determining range. However, proper conditions do not always exist on the battlefield. Consequently, the sniper will be required to use a combination of methods. The terrain might limit using the 100-meter unit-of-measure method, and the visibility could limit using the appearance-of-objects method. For example, an observer may not be able to see all of the terrain out to the target; however, he may see enough to get a general idea of the distance within 100 meters. A slight haze may obscure many of the target details, but the observer should still be able to judge its size. Thus, by carefully considering the approximate ranges as determined by both methods, an experienced observer should arrive at a figure close to the true range.

Range Calculation by Triangulation

One of the primary fallacies of sniper operations is the assumption that the sniper will be determining distance based on exposure of the target. This has led, in recent times, to reliance on the mil relation method. Under field conditions it is highly unlikely that the sniper will have a target exposure that will permit the use of the mil dot system or binoculars to obtain a reading. Even with a pre-calculated table on hand, the sniper will still need approximately 20 seconds to work out the mil relation formula. The sight picture will be lost as the sniper consults his data. Without the table, as much as two minutes are required to work out the mil relation formula.

To engage targets quickly, the sniper must have predetermined points on the field of view where the ranges are known. There are two points, at a minimum, that the sniper should have determined and ranged on. The first key distance is the weapon's point blank zero. The second key distance should be a point on the field where the sniper can quickly take a reference. This second key distance may be based on several factors. An enemy's expected avenue of approach or the possible dead space from which an enemy may approach are but two of the factors that may influence the selection of the second key distance.

The method for determining the key distance using triangulation is as follows:

1) The sniper picks a prominent terrain feature in his field of observation.

2) Facing his reference feature, he lays a base line 90 degrees out from his position. The base line should be a minimum of 10 meters in length. The longer the base line, the more accurate the determination will be.

3) Given that the angle from the reference feature to the sniper's position to the end of the base line is 90 degrees, the angle from the end of the base line to the reference feature is measured. This angle may be measured either in mils or degrees. However, the use of degrees will be difficult unless the sniper has binoculars with a built-in compass to aid in interpolation to one-tenth of a degree. Mils are much easier to work with and are more accurate.

4) The problem then becomes one of finding the length of one side of a triangle when all the angles are known (Figure 4-6-3). The length of one side (the base line) is also known.

$$AC = \frac{(AB) \times \sin B}{\sin C}$$

AC = Key distance or range.

AB = Base line length.

Note 1: The sum of the three angles in a triangle is equal to 180 degrees or 3200 mils. A triangle with a right angle (of a known value of 90 degrees or 1600 mils), the sum of the two other angles must therefore be 90 degrees or 1600 mils. In this formula, angle A is a right angle and measures 1600 mils (90 degrees). The sum of angles B and C will always equals 1600 mils (90 degrees).

Note 2: When this method is used, rarely will angle C exceed 53.333 mils (3 degrees). Nor will angle B measure less than 1546.666 mils (87 degrees). The sniper is recommended to carry a base line of cord (preferably a material that has little stretch) that is 50 meters long and is marked in 5-meter increments. This is sufficient to meet most contingencies.

Note 3: Experience has shown that the following length cords work well at the ranges indicated:

0-400 meters	10-meter cord
400-600 meters	20-meter cord
600-700 meters	30-meter cord
700-infinity	40-meter cord

SIN TABLE

DEGREES	SIN	DEGREES	SIN	DEGREES	SIN
0.1	.00175	1.1	.01920	2.1	.03664
0.2	.00349	1.2	.02094	2.2	.03839
0.3	.00524	1.3	.02269	2.3	.04013
0.4	.00698	1.4	.02443	2.4	.04188
0.5	.00873	1.5	.02618	2.5	.04362
0.6	.01047	1.6	.02792	2.6	.04536
0.7	.01222	1.7	.02967	2.7	.04711
0.8	.01396	1.8	.03141	2.8	.04885
0.9	.01571	1.9	.03316	2.9	.05059
1.0	.01745	2.0	.03490	3.0	.05234
87.0	.9986	88.0	.9994	89.0	.9998
87.1	.9988	88.1	.9995	89.1	.9999
87.2	.9988	88.2	.9995	89.2	.9999
87 3	.9989	88 3	.9996	89.3	.9999
87 4	.9990	88.4	.9996	89.4	.9999
87.5	.9990	88.5	.9997	89.5	1 0000

87.6	.9991	88.6	.9997	89.6	1.0000
87 7	.9992	87.7	.9997	89.7	1.0000
87.8	.9993	88.8	.9998	89.8	1.0000
87 9	9993	88.9	.999a	89.9	1.0000

NOTE: Rarely will any angle used in this method exceed 3 degreea at the reference feature, or be less than 87 degrees at the baseline unless the sniper carriea a baaeline of cooaiderable length. It ia recommended that the aniper carry a baseline of auspension line 50 metera long, marked in 5 meter iocrementa. Thia ia sufficient to meet moat contiogenciea.

Measuring

Measuring distance can ba accompliahed in two waya: measuring distance on a map or pacing the diatance between two points.

- Map (Paper-atrip Method)

The paper-atrip method ia uaeful whan determining longer diatancea (1,000 metera plus). When uaing thia method, the aniper placaa tha adga of a atrip of papar on the map and enaurea it ia long anough to rzach batwaao the two poiota. Then ha pencila in a tick mark on the papar at the taam poaition and another at tha diatant location. Ha placea the paper on tha map'a bar scale, locatad at the bottom center of the map, and aligna tha laft tick mark with tha 0 on the acale. Than ha raada to tha right to tha aacond mark and notas the corrasponding diatance repraaanted batwaan the two marka.

- Actual Measurement

Thia method is to actually pace tha diatance on tha ground. Pacing tha diatance batwaan two pointa ia one mathod a anipar can uae, provided tha enemy ia not in the vicinity. Thia obvioualy haa limited applicationa and can be very hazardoua to tha aniper taam. Thia ia ona of the laaat desirabla methoda.

Bracketing Mathod

The bracketing method ia uaed whan the aniper assumes that the targat is no leaa thao "X" metera away, but no more than "Y" metara away. The aniper theo uses the average of the two distances as the eatimated range. Snipers can increase their accuracy of range estimation by eye by using an average of both tesm members' eatimation.

Halving Method

The halving method is used for distaoces beyond 500 meters. The sniper selects a point midway to the target, determinea the number of 100-meter increments to the balfway point, and then doubles the eatimation. Again, it is best to average the rasults of both aniper team membera.

Range Card

The range card method is a very accurate means of estimating range. The mere fact that the sniper has had time to establish a range card means that he has been in the area long enough to become familiar with the target area. He has had the time to determine ranges to indicated reference points in the target area. The observer will give his targets to the sniper by giving deflections and distances from known reference points in the target field of view. The sniper can adjust his telescope for a good median distance in the target area and simply adjust fire from that point. There are two key distances that should be calculated and noted with references on the range card. The first is the point blank zero of the weapon. With a 300 meter zero the point blank zero of the M118 ammunition is 375 meters. Targets under this range do not need to be corrected for. The second key distance is merely a point of reference against which further distance determinations can be judged. This distance is determined by triangulation.

Speed of Sound

The approximate distance from the observer to a sound source (bursting shell, weapon firing, etc.) can be estimated by timing the sound. The speed of sound in still air at 50 degrees F is about 340 meters per second; however, wind and variations in temperature alter this speed somewhat. For practical use the sniper may assume the speed of sound is 350 meters per second under all conditions. The sound can be timed either with a watch or by counting from the time the flash appears until the sound is heard by the observer. The sniper counts "one-1,000, two-1,000" etc., to determine the approximate time in seconds. The time in seconds is then multiplied by 350 to get the approximate distance in meters to the source of the fire.

Measurement by Bullet Impact

Another undesireble but potentially useful method is to actually fire a round at the point in question. This is possible if you know your target is coming into the area at a later time and you plan to ambush the target. However, this method is not tactically sound and is also very hazardous to the sniper team.

Laser Range Finders

Laser range finders can also be used to determine range to a very high degree of accuracy. When aiming the laser at a specific target, the sniper should support it much the same as his weapon to ensure accuracy. If the target is too small, aiming the laser at a larger object near the target will suffice--that is, a building, vehicle, tree, or terrain feature. The range finder must be used with the yellow filter to keep it sys safe for the sniper and observer. This limits the range; however, the limitations are well within the range of the sniper, i.e., 20,000 meters. Rain, fog, or smoke will severely limit the use of laser range finders.

Sniper Cheat Book

The sniper team should keep a "cheat book" complete with measurements. The team fills in the cheat book during its area analysis, mission planning, isolation, and once in the area of operations. A tape measure will prove invaluable.

- Average height of human targets in area of operation.
- Vehicles.
  - Height of road wheels.
  - Vehicle dimensions.
  - Length of main gun tubes on tanks.
  - Lengths/sizes of different weapon systems.
- Urban environment.
  - Average size of doorways.
  - Average size of windows.
  - Average width of streets and lanes (average width of a paved road in the United States is 10 feet).
  - Height of soda machines.

As the sniper team develops its cheat book, all measurements are converted into constants and computed with different mil readings. An example of this can be found in Appendix C, which has already been computed for immediate use. This table should be incorporated into the sniper's log book.

Mil Relation (Worm Formula) Sample Problems:

Problem No. 1:

As a member of a sniper team, you and your partner are in your sniper hide and are preparing a range card. To your front you see a Soviet truck that you determine to be 4 meters long. Your team is equipped with an M24 system. Through your binoculars the truck is 5 mils in length. Determine the range to this reference for your system.

SOLUTION: STEP 1. No conversion needed.

STEP 2. Determine the range.

$$\text{Width} = \frac{4 \text{ meters} \times 1{,}000}{5 \text{ mils}} = 800 \text{ meters}$$

Problem No. 2:

You are a member of a sniper team assigned to cover a certain area of ground. You are making a range card and are determining ranges to reference points in that area. You see a tank located to

your front. Through your binoculars you find the width of the tank to be 8 mils. You determine the length of the tank to be 5 meters. You are equipped with an M21 system with an ART I telescope. Determine the correct range for your system.

SOLUTION: STEP 1. No conversion needed.

STEP 2. Determine the range.

$$\text{Width} = \frac{5 \text{ meters} \times 1{,}000}{8 \text{ mils}} = 625 \text{ meters}$$

4-7. SELECTION AND PREPARATION OF HIDES

To effectively accomplish its mission or to support combat operations, the sniper team must select a position from which to observe and fire. This position is called a sniper hide or post. Once constructed, it will provide the sniper team with a well-concealed post from which to observe and fire without fear of enemy detection. Selecting the location of a position is one of the most important tasks a sniper team must accomplish during the mission planning phase of an operation. After selecting the location, the team must also determine how it will move into the area and locate and occupy the final position.

Hide Selection

Upon receiving a mission, the sniper team locates the target area and then determines the best location for a tentative position by using one or more of the following sources of information: topographic maps, aerial photographs, visual reconnaissance before the mission, and information gained from units operating in the area.

In selecting a sniper hide, maximum consideration is given to the fundamentals and principles of camouflage/cover and concealment. Once on the ground, the sniper team ensures the position provides an optimum balance between the following considerations:

- Maximum fields of fire and observation of the target area.
- Maximum concealment from enemy observation.
- Covered routes into and out of the position.
- Located no closer than 300 meters from the target area.
- A natural or man-made obstacle between the position and the target area.

A sniper team must remember that a position that appears to be in an ideal location may also appear that way to the enemy. Therefore, it avoids choosing locations that are:

- On a point or crest of prominent terrain features.
- Close to isolated objects.
- At bends or ends of roads, trails, or streams.
- In populated areas, unless it is required.

The sniper team must use its imagination and ingenuity in choosing a good location for the given mission. The team must choose a location that not only allows the team to be effective but also must appear to the enemy to be the least likely place for a team position. The following are examples of such positions:

- Under logs in a deadfall area.
- Tunnels bored from one side of a knoll to the other.
- Swamps.
- Deep shadows.
- Inside rubble piles.

Hide Site Location

Determine the area location by the three factors of site location:

- Mission.
- Dispersion.
- Terrain patterns.

Select tentative sites and routes to the objective area by utilizing:

- Aerial photographs.
- Maps.
- Reconnaissance/after-action reports.
- Interrogations of assets, indigenous personnel, and prisoners of war.

- Weather reports.
- Area studies.

When utilizing these tools, look for:

- Terrain patterns (urban, rural, wooded, barren).
- Soil type (to determine tools).
- Population density.
- Weather conditions (snow, rain).
- Drainage.
- Types of vegetation.
- Drinking water.

Conduct a reconnaissance of the area to determine:

- Fields of fire.
- Cover and concealment.
- Avenues of approach.
- Isolated and conspicuous patterns.
- Terrain features lying between your position and the objectives.

Sniper Hide Checklist

There are many factors to consider in the selection, construction, and use of a sniper hide. The sniper team must remain alert to the danger of compromise and consider their mission as an overriding factor. The sniper team should use the following guidelines when selecting a site and constructing the sniper hide.

- When the situation permits, select and construct a sniper hide from which to observe and shoot. Because the slightest movement is the only requirement for detection, construction is usually accomplished at night. Caution still must be exercised, as the enemy may employ night vision devices, and sound travels greater distances at night.

- Do not place the sniper hide against a contrasting background or near a prominent terrain feature. These features are usually under observation or used as registration points.

- In selecting a position for the sniper hide, consider those areas that are least likely to be occupied by the enemy.

- Ensure that the position is located within effective range of the expected targets and that it affords a clear field of fire.

- Construct or employ alternate hides where necessary to effectively cover an area.

- Assume that the sniper hide is under enemy observation.

- Avoid making sounds.

- Avoid unnecessary movement.

- Avoid observing over a skyline or the top of cover or concealment that has an even outline or contrasting background.

- Avoid using the binoculars or telescope where light may reflect from the lenses.

- Observe ground a tree from a position near the ground. The snipers should stay in the shadows when observing from a sniper hide.

- Give careful consideration to the route into or out of the hide. A worn path can easily be detected. The route should be concealed and covered, if possible.

- Use resourcefulness and ingenuity to determine the type of hide to be constructed.

- When possible, choose a position that has a terrain obstacle (e.g., a river, thick brush, etc.) between it and the target and/or known or suspected enemy location.

Hide Site Occupation

During the mission planning phase, the sniper also selects an objective rally point (ORP). From this point, the sniper team reconnoitars the tentative position to determine the exact location of its final position. The location of the ORP should provide cover and concealment from enemy fire and observation, be located as close to the selected area as possible, and have good routes into and out of the selected area.

From the ORP, the team moves forward to a location that allows the team to view the tentative position area. One member remains in this location and covers the other member while he reconnoiters the area to locate a final position. Once a suitable location has been found, the covering team member moves to the position. While conducting the reconnaissance or moving to the position, the team:

- Moves slowly and deliberately, using the sniper low crawl.
- Avoids unnecessary movement of trees, bushes, and grass.
- Avoids making any noises.
- Stays in the shadows, if there are any.
- Stops, looks, and listens every few feet.

When the sniper team arrives at the firing position, it:

- Conducts a hasty and detailed search of the target area.
- Starts construction of the firing position, if required.
- Organizes equipment so that it is easily accessible.
- Establishes a system of observing, eating, resting, and latrine calls.

Hasty Sniper Hide

A hasty position is used when the sniper team will be in position for a short time, when it cannot construct a position due to the proximity of the enemy, or when it must immediately assume a position. Due to the limited nature of most sniper missions and the requirement to attack, the sniper team will, in most cases, use a hasty position.

A hasty position (fast find) provides protection from enemy fire or observation. It may be natural or artificial. Natural cover (ravines, hollows, reverse slopes, etc.) and artificial cover (foxholes, trenches, walls, etc.) protect the sniper from flat trajectory fires and enemy observation. Snipers must form the habit of looking for and taking advantage of every bit of cover and concealment the terrain offers. They must combine this habit with proper use of movement techniques to provide adequate protection from enemy fire and observation.

Cover and concealment in a hasty position provide protection from enemy fire and observation. The cover and concealment may be artificial or natural. Concealment may not provide protection from enemy fire. A sniper team should not make the mistake of believing they are protected from enemy fire merely because they are concealed from enemy eyes.

There should be no limitation on ingenuity of the sniper team in selecting a hasty sniper hide. Under certain circumstances it may be necessary to fire from trees, rooftops, steeples, logs, tunnels, deep shadows, buildings, swamps, woods, and an unlimited variety of open areas. How well the sniper team accomplishes the

misaion dependa to s large degree on the aniper team'a knowledge, underatanding, and spplication of the various field techniquea or skilla that allow them to move, hide, observe, and detect the enemy

Advantages:

o Requires no conatruction. The sniper team usea what ia avsilable for cover and concealment.

o Can be occupied in a ahort time. Aa aoon ss s suitable poaition ia found, the team need only prepare loopholes by moving small amounts of vegetation or by aimply backing a few feet away from the vegetstion that is slready there to conceal the weapon'a muzzle blaat.

Dissdvantages:

o Affords no freedom of movement. Any movement that is not slow snd deliberate may result in the tasm being oompromised.

o Restricts obeervstion of lsrge srsss. This typs of position is normslly usad to observe s spscific tsrgst srss (intersection, psssags, or crossing).

o Offers no protection from direct or indirect firss. Ths tesm hss only svsilsble cover for protection from direct firss.

o Relies hesvily on personsl csmouflage. The tesm's only protsction sgsinst detection is personsl csmouflsgs snd the sbility to use ths svsilsble terrsin.

Occupstion time. The team should not remain in this type of position longer thsn eight hours, which will only result in loss of effectiveness. This is due to muscle atrsin or crampa es e result of lack of freedom of movement combined with eye fstigue.

Expedient Sniper Hide

When s aniper tesm is required to remain in poaition for s longer time thsn the hssty poaition csn provide, sn axpedient position (Figure 4-7-1) should be conatructed. The expedient position lowers tha aniper'a ailhouette aa low to the ground aa possibla, but it atill sllowa him to fire and observe effectivaly. The axpedient poaition ia chsrscterized by the following:

Advantages:

o Requirea little conatruction. Thia poaition ia con-atructed by digging a hole in the ground juat large enough for the team and its equipment. Soil dug from this position can be plsced in asndbaga and used for building firing platforma.

o Conceals most of the body end equipment. The optics, rifles, and heads of the sniper teem ere the only items that ere ebove ground level in this position.

o Provides some protection from direct fires due to its lower silhouette.

Disedvantages:

o Affords little freedom of movement. The team has more freedom of movement in thie position then in the hasty position. However, teams must remember that stretching or reeching for e canteen causes the exposed head to move unless controlled. Teem members can lower the hsed below ground level, but this ehould be done slowly to ensure e target indicetor ie not produced

o Allowe little protection from indirect firee. Thie position doee not protect the teem from ehrepnsl end debrie falling into the poeition.

o Exposes the heed, weepone, end optice. The teem muet rely heevily on the camoufleging of theee exposed iteme.

Conetruction time: 1 to 3 houre (depending on the eituetion).

Occupetion time: 6 to 12 houre.

Belly Hide

The belly hide (Figure 4-7-2) ie eimiler to the expedient poeition, but it hes overheed cover that not only protecte the tsem from the effecte of indirect firee but eleo ellowe more freedom of movement. A belly hide ie beet ueed in mobile eituetione or when the eniper doss not intend to be in the poeition for extended periods of time. Thie poeition cen be dug out under e tree, e rock, or eny eveileble object that will provide overheed protection and e conceeled entrence end exit. The belly hide ie charecterized by the following:

Adventeges:

o Allows some freedom of movement. The derkened erea inside this position ellows the teem to move freely. The team must rsmsmber to cover the entrence/exit hole with e poncho or piece of cenvas so outside light does not eilhouette the team ineide the position.

o Conceals ell but the rifle berrel. All equipment is inside the position except the rifle berrele, but the barrels could be inside, depending on the room available to construct the position.

- Provides protection from direct and indirect fires. The team should try to chooae a poaition that has an object that will provide good overhead protection (rock, tracked vehicle, rubble pile, and so forth), or prepare it in the same manner aa overhead cover for other infantry poaitiona.

- The hide ia simple end can be quickly built. This hide can be used when the sniper ia mobile, becauae many cen be built.

Diaedventeges:

- The hide ie uncomfortable.

- The hide cannot be occupied for long periода of time.

- The sniper ie expoeed while firing.

- The hide providee limited protection from the weether or fire.

- The eniper hee to enter the poeition from the front.

- Requiree extre construction time.

- Requires extre materiela end toole. Conetruction of overheed cover will require eewe or exee, weterproof meteriel, end eo forth.

- Hae limited epece. The eniper teem will heva to ley in the belly hide without e lot of varietion in body poeition due to limited epece end deeign of the poeition.

Conetruction.

- Dig a pit (ehellow) for the prone position.

- Omit the parapet.

- Build an overhead cover using:

  * Dirt/aod.
  * A drop cloth.

  * Woven seplinga.

  * Corrugated metal, ahell boxea, acrap metal, doors, chicken wire, acrap lumber, etc.

Construction time: 4 to 6 houra.

Occupation time: 12 to 48 hours.

Semipermenent Sniper Hide

The semipermenent hide (Figure 4-7-3) is used mostly in a defensive or outpost situation. This position requires additional equipment end personnel to construct. However, it will allow sniper teams to remain there for extended periods or be relieved in place by other sniper teams. Like the belly hide, this position can be constructed by tunneling through a knoll or under natural objects already in place. This prepared sniper hide should provide sufficient room for movement without fear of detection, some protection from weather and overhead or direct fire, and a covered route to and from the hide.

A semipermanent hide can be an enlargement of the standard one- or two-man fighting position with overhead cover (Figure 4-7-4). This type of hide is constructed when in a defensive posture, since considerable time is required for its construction, and it would be suitable when integrated into the perimeter defense of a base camp, during static warfare, or during a stay-behind infiltration. It can be constructed as a standing or lying type of hide.

The construction of loopholes requires care and practice to ensure that they afford an adequate view of the required fields of fire. The loopholes should be constructed so that they are wide at the back where the sniper is and narrow in the front, but not so narrow that observation is restricted. Loopholes may be made of old coffee cans, old boots, or any other rubbish, provided that it is natural to the surroundings or that it can be properly and cleverly concealed.

Loopholes may be holes in windows, shutters, roofs, walls, or fences, or they may be constructed by the sniper team. Loopholes must blend in with the surrounding area.

Advantages:

o Offers total freedom of movement inside the position. The team members can move about freely. They can stand, sit, or even lie down.

o Protects against direct and indirect fires. The sniper team should look for the same items as mentioned in the belly hide.

o Is completely concealed. Loopholes are the only part of the position that can be detected. They allow for the smallest exposure possible; yet, they still allow the sniper and observer to view the target area. The entrance/exit to the position must be covered to prevent light from entering and highlighting the loopholes. Loopholes that are not in use should

be covered from the inside with a piece of canvas or suitable material.

- Is easily maintained for extended periods. This position allows the team to operate effectively for a longer period.

Disadvantages:

- Requires extra personnel and tools to construct. This position requires extensive work and more tools. Very seldom can a position like this be constructed near the enemy, but it should be constructed during darkness and be completed before dawn.

- Increases risk of detection. Using a position for several days or having teams relieve each other in a position always increases the risk of the position being detected. Snipers should never continue to fire from the same position.

Construction time: 4 to 6 hours (4 personnel).

Occupation time: 48 hours plus (relieved by other teams).

Types of Deliberate Sniper Hides

Enlarged fire trench hides. An enlarged fire trench hide is an enlarged fighting position (Figure 4-7-5).

Advantages:

- The sniper team is able to maintain a low silhouette.

- The hide is simple to construct.

- The hide can be occupied for a moderate period of time with some degree of comfort.

Disadvantages:

- The hide is not easily entered into or exited from.

- The sniper team has no overhead cover when in firing position.

- The sniper team is exposed while firing or observing.

Construction.

- Enlarge and repair the sides and the parapet.

- Camouflege the hide with a drop cloth.

Shell hole hides. A shell hole hide is a crater improved for kneeling, sitting, or prone firing positions (Figure 4-7-6).

Advantages:

- Construction of the hide does not require much digging.

Disadvantages:

- The hide raquires material to secure the aides.
- There ia no drainage.

Construction.

- Dig platforms for either tha prone, tha knaaling, or the aitting poaitiona.
- Rainforca the aides of the cratera.

Tree or stump hides (Figura 4-7-7).

Advantagea:

- Tha hida can be rapidly occupiad.
- Tha aniper team is protacted from fire and ahrapnal.
- Tha sniper taam has fraadom of movemant.
- The hide provides comfort.

Diaadvantages:

- The hide takes time to construct.
- The sniper team raquires pioneer equipment for construction of the hide (picks, shovels, axes, atc.).

Conatruction. In selecting trees for hides, use trees thet have a good, deep root auch as oak, chestnut, or hickory. During heavy winds these treea tend to remain ateady better than e pine tree, which has surfece roots end sways e bit in e breeze. A lerge tree that is back from the woodline should be used. This may limit the view, but will provide better cover and concealment.

Hide Site Conatruction Conaiderations

A sniper mission alwaya requires the team to occupy some type of poaition. Theae poaitions can range from a hasty pos ion, which a team may uae for a few hours, to a more permanent po: ion, which the team could remain in for a few days. When choosing and constructing positions, the aniper team must use ita imagination and ingenuity to reduce the time and difficulty of position construction The team ahould alwaya plan to build its position during limited visibility.

Sniper Poaition Conaiderations. Whether e aniper team will be in a position for a few minutes or e few daya, the basic considerations in chooaing a type of poaition remain the same.

o Location:

* Type of tarrain and aoil. Digging and boring of tunnala can ba very difficult in hard soil or in fine, looae aand. Tha team naeds to take advantaga of what tha terrain offera (gulliaa, holea, hollow trae atumpa, and ao forth).

* Enamy location and capabilitiaa. Enemy patrola in the araa may ba cloaa anough to tha poaition to haar any noiaaa that may accidantally be mada during any conatruction. Tha taam alao naad to considar the anamy'a night viaion and datection capabilities.

o Tima:

* Amount of time to be occupiad. If tha anipar taam'a misaion raquiraa it to be in poaition for a long tima, the team muat conaidar conatruction of e poaition that providaa mora aurvivability. This allowa tha team to operata mora affectivaly for s longer tima.

* Time needed for conatruction. The time needed to build a poaition muat be e consideration, eapacially during the mission planning phaae.

o Peraonnel and equipment:

* Equipment needed for conatruction. The team must plan the uae of any extra equipment needed for construction (bow aaws, picka, axes, and ao forth).

* Personnel needed for construction. Coordination must take place if the position requires more personnel to build it or a aecurity element to secure the area during conatruction.

Steps Used In the Construction Of a Sniper Hide

When the sniper team is en route to the objective area, material that can be used for constructing the hide should be marked. The team should establish an objective rallying point, reconnoiter the objective area, select a site, and mark the fields of fire and observation. After collecting additional material, the team returns to the sniper hide site under the cover of darkness and begins construction of the hide.

- o Post security.
- o Remove the top soil (observe construction discipline).
- o Dig a pit. Dispose of soil properly and reinforce the sides. Ensure that the pit has:
  - * Loopholes.
  - * A bench rest.
  - * A bed.
  - * A drainage sump (if appropriate).
- o Construct an overhead cover.
- o Construct an entrance/exit by escape routes noted.
- o Camouflage the hide.
- o Inspect the hide for improper concealment (continuous).

Hide Site Construction Techniques

- o Frontal protection. Regardless of material, every effort is made to bulletproof the front of the hide position. The team can use the following techniques:
  - * Pack kevlar flak jackets around the loophole areas.
  - * Emplace an angled armor plate with a loophole cut into it behind the hide loophole.
  - * Sandbag the loopholes from the inside.
- o Pit. Hide construction begins with the pit since it protects the sniper team. All excavated dirt is removed (placed in sandbags, taken away on a poncho, and so forth) and hidden (plowed fields, under a log, or away from the hide site).
- o Overhead cover. In a semipermanent hide position, logs should be used as the base of the roof. The sniper team places a dust cover over the base (such as a poncho, layers of empty sandbags, or canvas), a layer of dirt, and a layer of gravel, if

svailable. The team spresds another layer of dirt, and then adds cemouflsge. Due to the vsrioua materiels, the roof ia difficult to concasl if not counteraunk.

o Entrsnce To prevent detection, the sniper team should construct sn entrance door aturdy enough to besr s man's weight.

o Loopholes. The conatruction of loopholes (Figure 4-7-8) raquires care snd practice to enaure that they afford adequste fields of firs. Thaae loopholes ahould have a lsrge dismeter (10 to 14 inches) in the interior of tha poaition snd tapar down to s smallsr diameter (4 to 8 inches) on the outside of the position. A position msy hsve more than two eets of loopholea if needed to cover large sreas. Loopholaa muet be camouflaged by foliage or other material that blends with or ie natural to the surroundinga.

o Approsches. It ia vital that the natursl appearsnce of the ground remsins unsltered snd camouflege blanda with the surroundinge. Remember, construction time ia wsated if the enemy observes s tesm entsring the hide; therefore, sppraschea muat be oonoesled whenever possible. Teems should try to enter the hide during darknesa, keeping movemont around it to a minimum snd sdhering to treil discipline. In built-up ereaa, s secure snd quiet epproach is needed. Teams should svoid drswing sttention to the mission snd cerefully plen movement. A possible ploy ie to uae a houee eesrch with sniper geer hidden among other gesr. Sewers may be used for movement eleo.

WARNING: WHEN MOVING THROUGH SEWERS, TEAMS MUST BE ALERT FOR BOOBY TRAPS AND POISONOUS GASES.

<u>Tools, Materials, and Equipment Needed To Construct a Sniper Hide</u>

The toola neadad to build e sniper hide depend on the aoil, the terrsin, and the type of hids to be built. Some consideretions are:

- Entrenching toole.
- Bsyonete.
- GP nata.
- Ponchos.
- Wetsrproof bags.
- Ruckaacks.
- Shovela.
- Picks.

- Axes/hatchets.
- Hammers.
- Machetes.
- Chisels.
- Saws (hacksaws, etc.)
- Screwdrivers, pliers, garden tools.

Materials for the construction of a hide are varied. Some of the materials that will be needed are:

- Garbage bags.
- Wood glue.
- Nails.
- Chicken wire, newspapers, flour, water.

Hide Site Routines

Although the construction of positions may differ, the routines while in position are the same. The sniper and the observer should have a good firing platform. This gives the sniper a stable platform for the sniper weapon and the observer a platform for the optics. When rotating observation duties, th sniper weapon should remain in place, and the optics are handed from one member to the other. Data books, observation logs, range cards, and the radio should be placed within the team where both members have easy access to them. A system of resting, eating, and latrine calls must be arranged within the team. All latrine calls should be done during darkness, if possible. A hole should be dug to conceal any traces of latrine calls.

4-8. SNIPER RANGE CARD, OBSERVATION LOG, AND MILITARY SKETCH

The sniper team uses range cards, observation logs, and military sketches to enable it to rapidly engage targets and maintain a record of its employment during an operation.

Range Card

The range card represents the target area drawn as seen from above with annotations indicating distances throughout the target area. Information is recorded on DA Form 5787-R (Sniper's Range Card) (Figure 4-8-1). (A blank copy of this form is located in Appendix N for local reproduction). The range card provides the

sniper team with a quick-range reference and a means to record target locations, since it has preprinted range rings on it. These cards can be divided into sectors by using dashed lines (Figure 4-8-2). This provides the team members with a quick reference when locating targets. A field-expedient range card can be prepared on any paper the team has available. The sniper team position and distances to prominent objects and terrain features are drawn on the card. There is not a set maximum range on either range card, because the team may also label any indirect fire targets on its range card. Information contained on both range cards includes:

- Sniper's name and method of obtaining range.
- Left and right limits of engageable area.
- Major terrain features, roads, and structures.
- Ranges, elevation, and windage marked at various distances.
- Distances throughout the area.
- Temperature and wind. (Cross out previous entry whenever temperature, wind direction, or wind velocity changes.)
- Target reference points (azimuth, distance, and description).

Relative locations of dominant objects and terrain features should be included. Examples are:

- Houses.
- Bridges.
- Groves
- Hills.
- Crossroads.

The sniper team will indicate the range to each object by estimation or measuring. All drawings on the range card are from the perspective of the sniper looking straight down on the observation area.

Observation Log

The observation logbook is a written, chronological record of all activities and events that take place in a sniper team's area. It is used with military sketches and range cards; this combination not only gives commanders and intelligence personnel information about the appearance of the area, but it also provides an accurate

record of the sctivity in ths srsa. Information is recorded on DA Form 5786-R (Sniper's Observation Log) (Figure 4-8-3). (A blsnk copy of this form is located in Appendix N for local reproduction). Information in ths observation logbook includes.

- Grid coordinstss of ths sniper team's position.
- Observer's name.
- Dste snd tims of obssrvation snd viaiblity.
- Sheet number snd number of total sheets.
- Serias numbsr, time, snd grid coordinstes of each event.
- The event that haa takan place.
- Action taken.

Tha aniper log will alwaya be uaed in conjunction with a military akstch. This halps to aarva aa a pictorial reference to tha written log. If ths snipar taam ia raliavad in place, a new aniper taam can easily locata aarliar aightinga uaing thaaa two documanta aa refarencea. The obeerver's log ia a rssdy maane of recording enamy activity, and if properly maintained, it anablea tha anipar taam to raport all information required.

Snipar obsarvation loga will be fillad out uaing tha kay word SALUTE for anamy activity and OCOKA for tarrain. When uaing thaae ksy worda to fill out the loga, the aniper ahould not uae ganaralitiea; he ahould be very apecific (i.e., give the exact numbar of troopa, the axact location, the diaperaion location, atc.).

Tha rsngs csrd ia a record of the aniper's observationa and preparationa. Ita proper preparation and uae providaa a quick reference to key terrain festures and targeta. It also allows the aniper tesm to quickly acquirs nsw targsta that come into their area of observstion. The aniper's range card and the observstion log are alwaya uaed in conjunction with each other.

The key word "SALUTE":

S - Size.

A - Activity.

L - Locstion.

U - Unit/Uniform.

T - Time.

E - Equipment.

The key word "OCOKA":

O - Observation and fields of fire.

C - Cover and concealment.

O - Obstacles.

K - Key terrain.

A - Avenues of approach.

Military Sketch

DA Form 5788-R (Military Sketch) is used to record information about a general area, terrain features, or man-made structures that are not shown on a map. Military sketches provide intelligence sections a detailed, on-the-ground view of an area or object that is otherwise unobtainable. These sketches not only let the viewer see the area in different perspectives but also provide detail such as type of fences, number of telephone wires, present depth of streams, and so forth. There are two types of military sketches as stated in FM 21-26: road/area sketches and field sketches. Both types of sketches are recorded on DA Form 5788-R. (A blank copy of this form is located in Appendix N for local reproduction.)

Road/Area Sketch. A road/area sketch (Figure 4-8-4) is a panoramic representation of an area or object drawn to scale as seen from the sniper team's perspective. It shows details about a specific area or a man-made structure. Information considered in a road/area sketch includes:

- Grid coordinates of sniper team's position.
- Magnetic azimuth through the center of sketch.
- Sketch name and number.
- Scale of sketch.
- Remarks section.
- Name and rank.
- Date and time.
- Weather.

Field Sketches. A field sketch (Figure 4-8-5) is a topographic representation of an area drawn to scale as seen from above. It provides the sniper team with a method for describing

large areas while showing reliable distance and azimuths between major features. This type of sketch is useful in describing road systems, flow of streams/rivers, or locations of natural and man-made obstacles. The field sketch can also be used as an overlay on the range card. Information contained in a field sketch includes:

- Grid coordinates of the sniper team's position.
- Left and right limits with azimuths.
- Rear reference with azimuth and distance.
- Target reference points.
- Sketch name and number.
- Name and rank
- Date and time.
- Weather and visibility.

The field sketch serves to reinforce the observation log. A military sketch is either panoramic or topographic.

- Panoramic sketch. The panoramic sketch is a picture of the terrain in elevation and perspective as seen from one point of observation.
- Topographic sketch. The topographic sketch is similar to a map or pictorial representation from an overhead perspective. It is generally less desirable than the panoramic sketch because it is difficult to relate this type of sketch to the observer's log. It is drawn in a fashion similar to the range card.

Guidelines for Drawing Sketches

As with all drawings, artistic skill is an asset, but satisfactory sketches can be drawn by anyone with practice. The following are guidelines when drawing sketches:

- Work from the whole to the part. First determine the boundaries of the sketch. Then sketch the larger objects such as hills, mountains, or outlines of large buildings. After drawing the large objects in the sketch, start drawing the smaller details.
- Use common shapes to show common objects. Do not sketch each individual tree, hedgerow, or woodline exactly. Use common shapes to show these types of objects. Do not concentrate on the fine details unless they are of tactical importance.
- Draw in perspective; use vanishing points. Try to draw sketches in perspective. To do this, recognize the vanishing

points of the area to be sketched. Parallel lines on the ground that are horizontal vanish at a point on the horizon (Figure 4-8-6). Parallel lines on the ground that slope downward away from the observer vanish at a point below the horizon. Parallel lines on the ground that slope upward, away from the observer, vanish at a point above the horizon. Parallel lines that recede to the right vanish on the right and those that recede to the left vanish on the left (Figure 4-8-7).

Panoramic Sketching

In order for the sniper team to effectively observe their entire area of responsibility thoroughly, they must be aware of the slightest change in the area. These otherwise insignificant changes could be an indicator of targets or enemy activity that needs to be reported. By properly constructing a panoramic sketch, the snipers have a basis for comparing small changes in the surrounding terrain. This permits the team to better report intelligence and complete their mission.

General principles of sketching:

o The panoramic sketch is initiated only after the observer's log and range card have been initiated and after the sniper team has settled into the area of operations.

o The terrain is studied with the naked eye first to get an overall impression of the area. After the overall impression has been obtained, those areas that attracted the sniper's attention is studied in further detail with binoculars before the first mark is made on a sketch pad.

o Too much detail is not desirable, unless it is of tactical importance. If additional detail is required on a specific area, the sniper can make subdrawings to supplement the main drawing.

Principles of perspective and proportionality:

o Sketches are drawn to perspective whenever possible. To accomplish this, he must remember that the farther away an object is, the smaller it will appear in the drawing.

o Vertical lines will remain vertical throughout the drawing; however, a series of vertical lines (such as telephone poles or a picket fence) will diminish in height as they approach the horizon.

Use of delineation to portray objects or features of the landscape (Figure 4-8-8):

o The horizontal line is the line formed by the intersection of the ground or sky with the horizontal plane at the height of the sketcher's eye.

o The skyline or the horizon and crests, roads, and rivers form the "control lines" of the sketch. These areas are drawn first to form the framework within which the details can be placed.

o Represent features with a few, rather than many, lines Create the effect of distance by making lines in the foreground heavy and making distance lines lighter as the distance increases

o A light "hatching" may be used to distinguish wooded areas, but the hatching should follow the natural lines of the object (Figure 4-8-9).

Use of the conventional methods to portray objects:

o If possible, the actual shape of all prominant features that may be readily selected as reference points when describing targets are shown. These features may be accepted with an arrow and with a line to a description; e.g., a prominant tree with a withered branch.

o Rivers and roads are drawn as two lines that diminish in width to the vanishing point as they recede.

o Railroads in the foreground are shown as a double line with small cross lines (which represent ties). This will distinguish them from roads. To portray railroads in the distance, a single line with vertical ticks to represent the telegraph poles is drawn. When rivers, roads, and railroads are all present in the same sketch, they may have to be labelled to show what they are.

o Trees are represented in outline only, unless a particular tree is to be used as a reference point. If a particular tree is to be used as a reference point, the tree must be drawn in more detail to show why it was picked.

o Woods in the distance are shown by outline only. If the woods are in the foreground, the tops of individual trees can be drawn.

o Churches are shown in outline only, but it should be noted whether they have a tower or a spire.

o Towns and villages are drawn as definite rectangular shapes to denote houses. The location of towers, factory chimneys, and prominent buildings shown in the sketch. Again, detail, if necessary, can be added in subdrawings.

o Cuts, fills, depressions, swamps, snd marshes are shown by using the usual topogrsphic symbols.

A legend is used to lsbel the sketch:

o Included in the legend is the title of the sketch, the DTG (dste, time, group), snd the sketcher's signature.
o Included in the legend is sn explanation of the topographic symbols used in the sketch.

4-9. KIM GAMES

Sniper operations encompsss s much lsrger scope than hiding in the woods, spotting tsrgets of opportunity snd engaging them. The sniper muat observe vast sress snd accurately record any and sll information of his area and what occura in his aaaigned area. Because many aituations occur auddsnly snd do not offer prolonged obaarvation, anipers muat train thsmsslvss to observe situationa for short psriods of time and extract the maximum amount of informstion from any given aituation.

Keap-in-memory (KIM) gamea are a aeriea of exerciaaa with tha intent of increaaing tha aniper'a abilitiea to both perceive reality and retain information. KIM gamea can be conducted anywhers, in very little time, with a large return for tha trainer'a inveatment of effort and imagination. Although ths various time limits of viewing, waiting, snd recording ths objects are oftan not raflactsd in tactical reality, KIM games are deaigned to exercisa tha mind through overload (much the aame aa weight training overloads the muaclea).

Advancement in Kim'a Gamea ia measured by ahortaning the viewing and recording timea and lengthening the waiting time. Grestar raaulta can be realized by GRADUALLY adding additional alements to increaae confuaion snd uncertainty. In the snipsr's trade, the percsption of reslity oftan meana penetrating the enemy's deception mesaurea. Theae measurea may include, but ars not limited to:

- Misdirection.
- Disguise.
- Exchange.

There is a marked similsrity between the sbove list and the principles of stage magic. Just ss knowing how s magician psrforms a trick takes the "msgic" from it, knowing how one is being deceived negates the deception.

The Basic Gsme

The instructor will require s tsble, s cover, and an aseortment of objects. Ten objects sre selected snd plsced randomly on the tsble. The objects should not be placed in orderly rows, since studies hsve shown that objects that are placed in rows make memorization essier. The objecte sre then covered. The students must ba briefed on the rules prior to esch iteration:

- No tslking is allowed.
- Objecte may not ba touched.
- Students will not write until told to do so.

The students sre gsthered sround the tsble. The cover ie removed, snd the time for viewing begins. When the time is up, the cover ie replaced, snd students return to their sests. After a deeignated intervsl, the students will begin to write their obssrvstions within s dasignetad time limit. To sid in retsining snd rscording thsir observstions, standardized cstsgoriss srs ussd throughout:

- Appssrs to bs (ATB).
- Sizs.
- Color.
- Condition.

It must be stressed that the sbovs cstsgoriss ars not intsndsd for uss in s tscticsl setting.

The Savelli Shuffle

A vsristion of the KIM gsme thst trains the syss to "look. fsster" snd coordinstes hsnd to eys is the Ssvelli Shuffle. Two individusls fsce esch other spproximately 5 meters apart. The first msn hss s bsg containing e number of yellow rubber bslls snd s smsller number of red rubber balls. The second msn hss sn empty bag. The first msn reaches into his bsg snd picke out s ball, concesling it from the second man. The first man toeeee the ball to the second msn. Velocity will depend on level of experience.

The second man hss s quick decision to mske: catch yellow balle with the left hand, red balle with the right hand. The eecond man then places the csught balls into hie bag.

This procees is repested until the first msn's bag is emptied. Positions of the first men snd the second man sre exchanged. Advancement in thie axarcise is messured by the speed at which the bslls sre thrown snd the distence hetween men.

Interest and Attention

When learning to observe, a distinction must be made between interest and attention. Interest is a sense of being involved in some process, actual or potential. Attention is a simple response to a stimulus, such as a loud noise. Attention without interest cannot be maintained for very long. During long periods of uneventful observation, attention must be maintained through interest. Deception at the individual level can be thought of as manipulation of interest.

4-10. NIGHT OPERATIONS

Without night vision devices, the sniper team must depend upon eyesight. Regardless of night brightness, the human eye cannot function at night with daylight precision. For maximum effectiveness, the sniper team must apply the following principles of night vision:

- Night Adaptation. The sniper team should wear sunglasses or red-lensed goggles in lighted areas before departing on a mission. After departure, the team makes a darkness adaptation and listening halt for 30 minutes.

- Off-Center Vision. In dim light, an object under direct focus blurs, appears to change, and sometimes fades out entirely. However, when the eyes are focused at different points, about 5 to 10 degrees away from an object, peripheral vision provides a true picture. This allows the light-sensitive portion of the eye, that not used during the day, to be used.

Factors Affecting Night Vision

The sniper team has control over the following night vision factors:

- Lack of vitamin A impairs night vision. However, an overdose of vitamin A will not increase night vision capability.

- Colds, fatigue, narcotics, headaches, smoking, and alcohol reduce night vision.

- Exposure to bright light degrades night vision and requires a readaption to darkness.

Illumination Aids

The sniper team may occasionally have artificial illumination for observing and firing. Examples are artillery illumination fire, campfires, or lighted buildings.

- Artillery Illumination Fire. The M301A2 illuminating cartridge provides 50,000 candlepower.

o Cempfires. Poorly disciplined enemy soldiers may use campfiree, or firea may be created by battlefield damage. Theae opportunitiea give the aniper enough illumination for eiming.

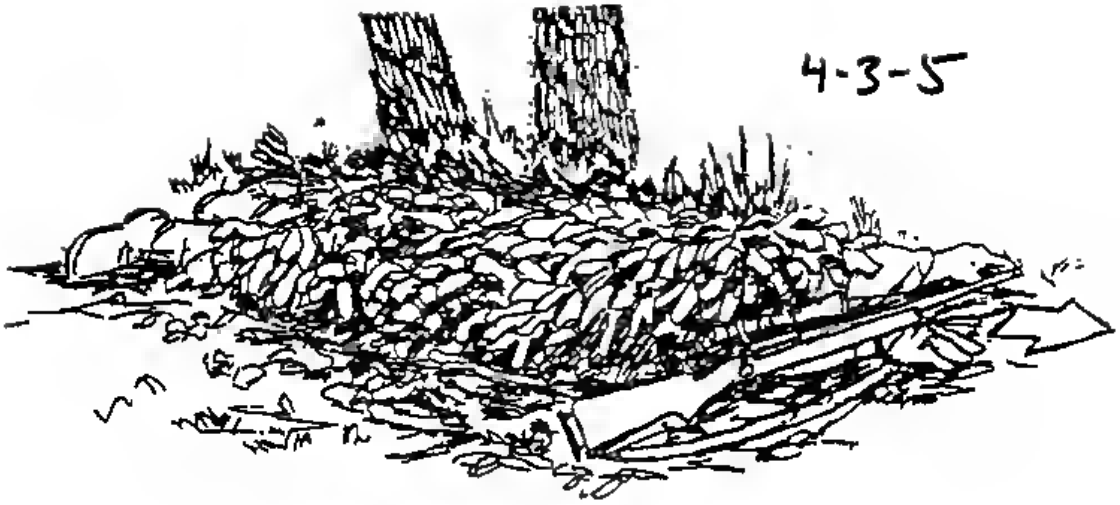
o Lighted Buildinge. The sniper cen use lighted buildings to eliminate occupanta of the building or pereonnel in the immediate area of the light aource.

4-3-1

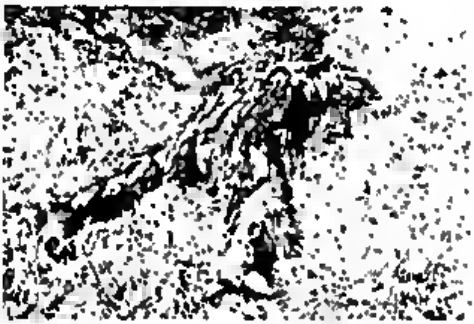
4-3-2

4-3-3

4-3-4



4-3-5



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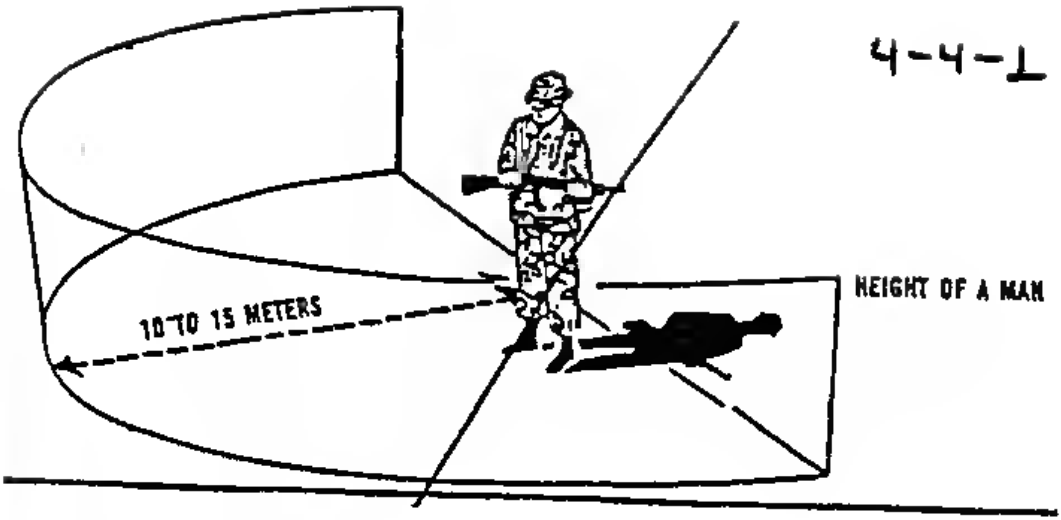
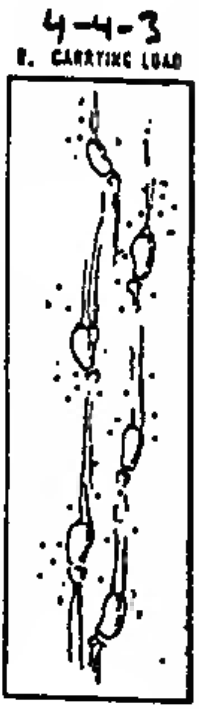
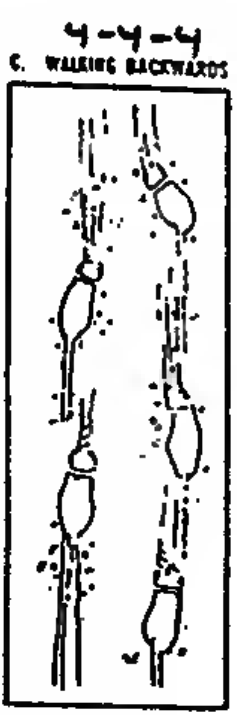
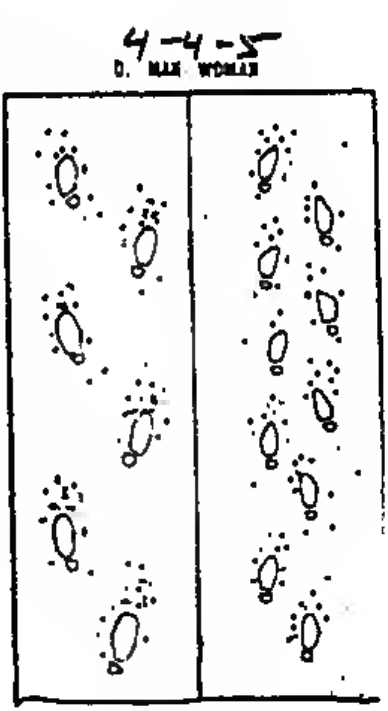


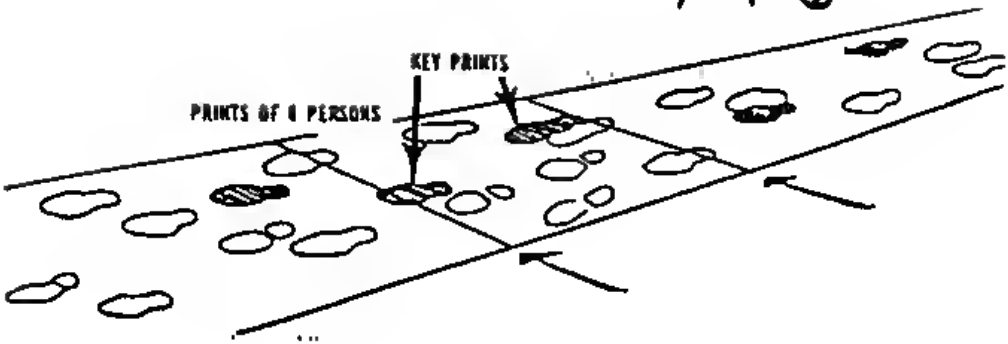
Area being surveyed for indicators.







4-4-6



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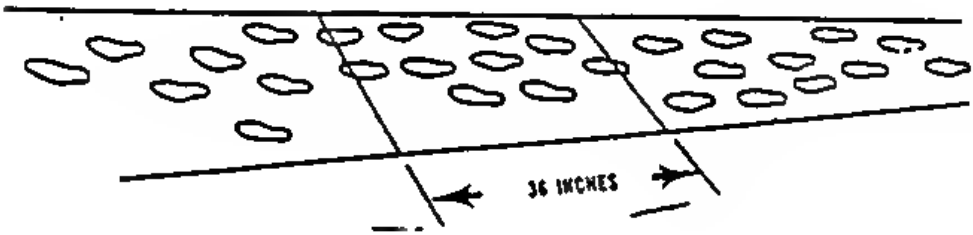


4-4-8

A. TURNED OVER ROCKS AND STICKS

4-4-8

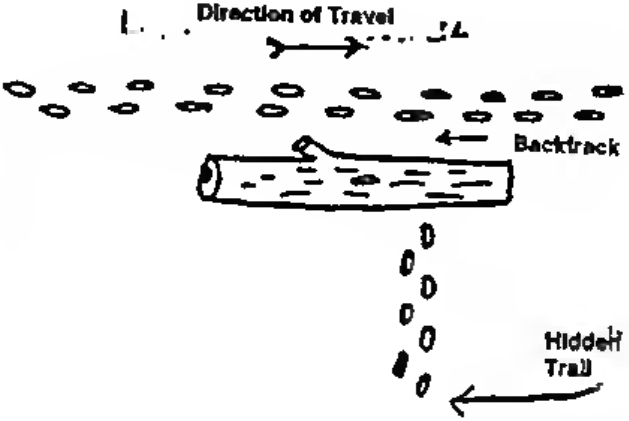
B. CRUSHED AND DISTURBED VEGETATION

4-4-9

C. SLIP MARK AND WATERFILLED FOOTPRINTS ON STREAM BANKS.

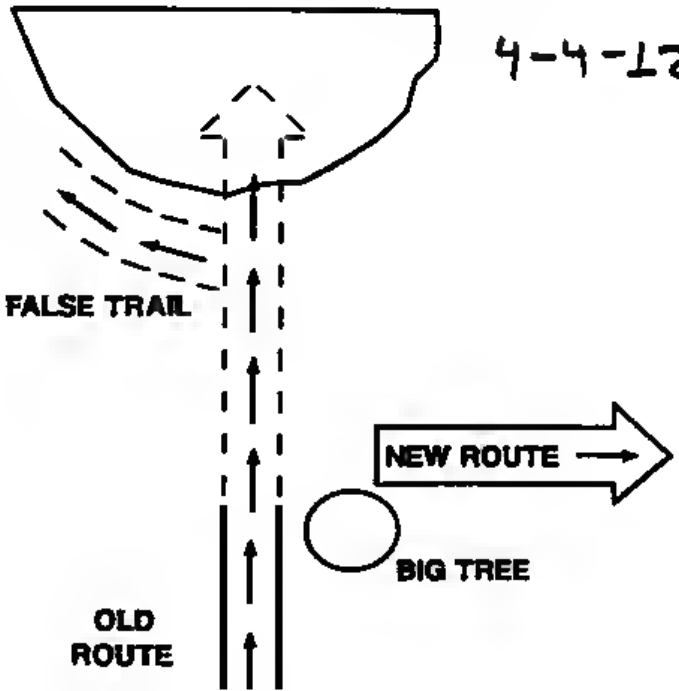
4-4-10

4-4-11



BIG TREE TECHNIQUE

4-4-12



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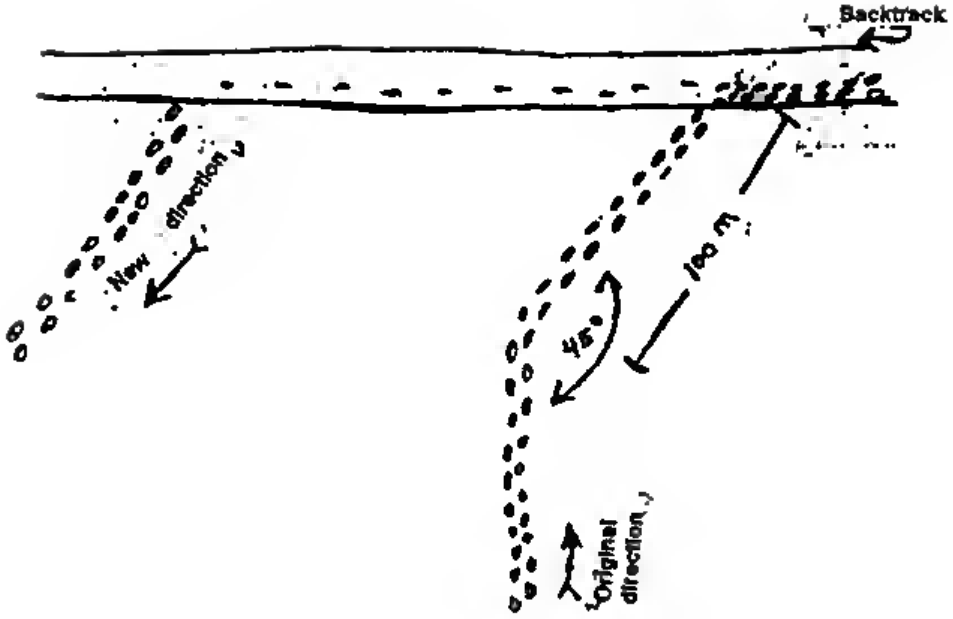
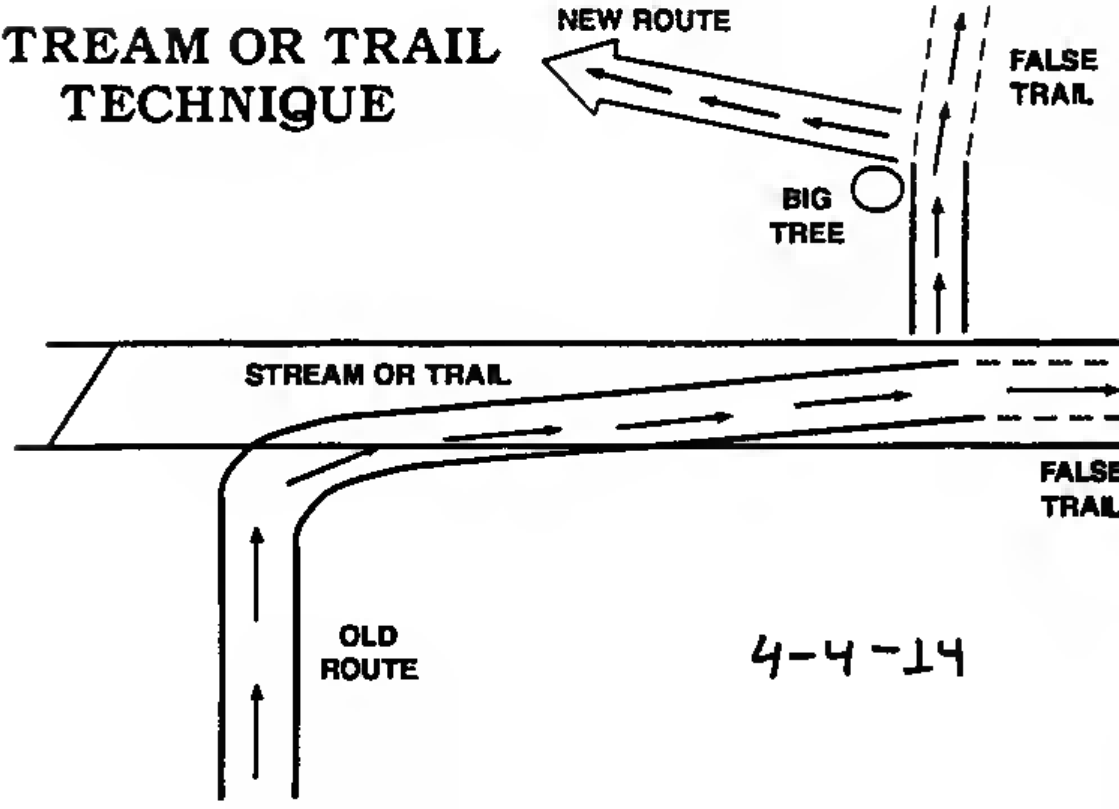


STREAM OR TRAIL TECHNIQUE



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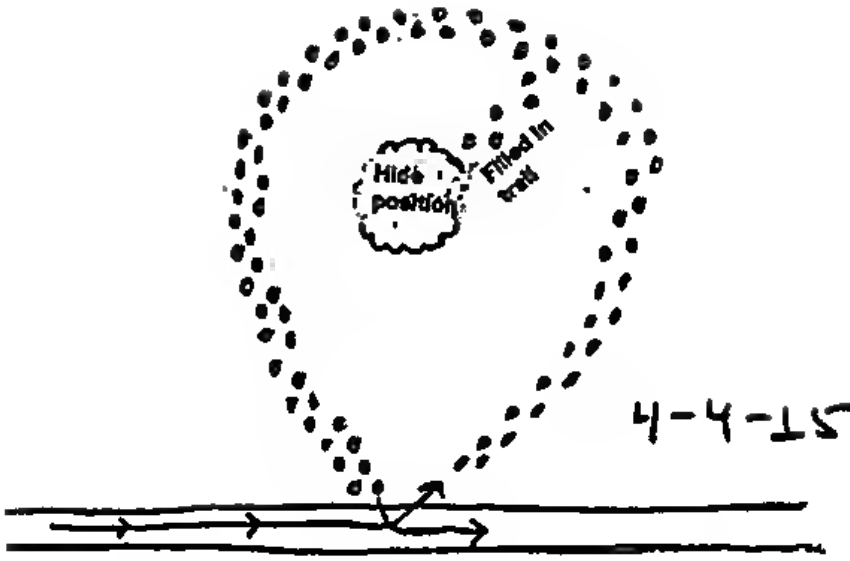

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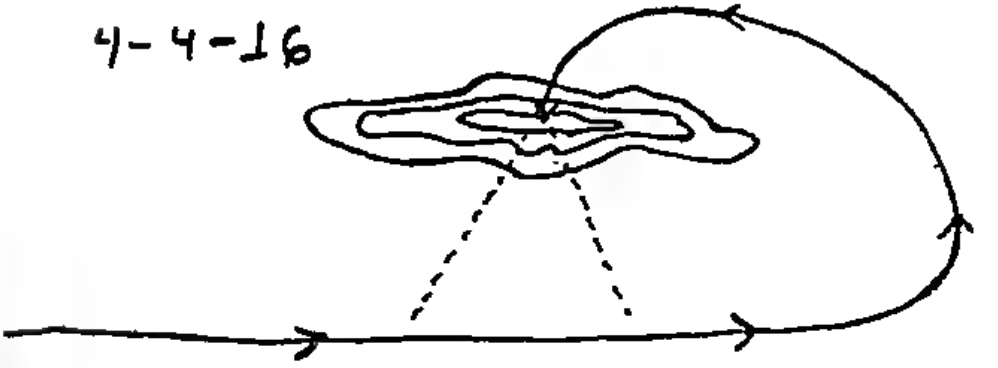
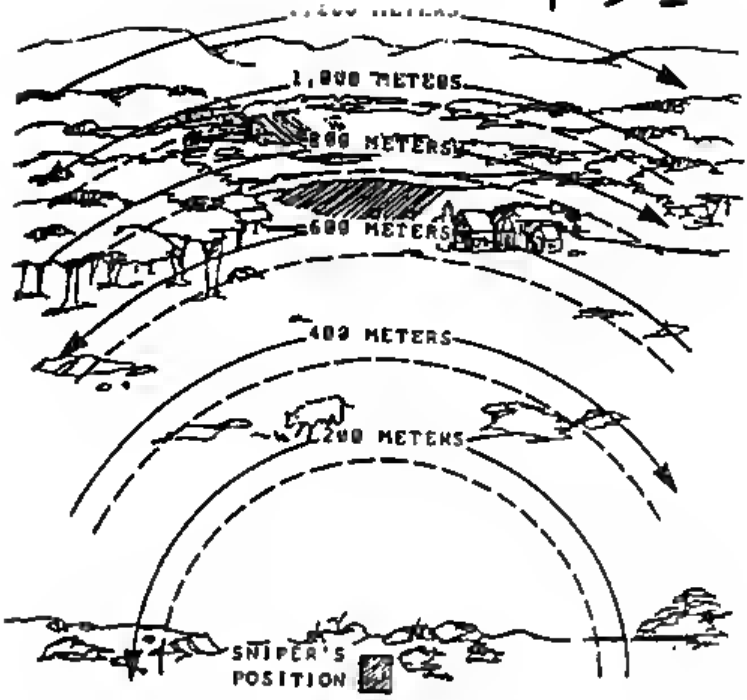
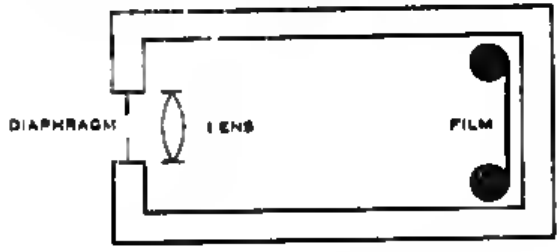
4-4-16

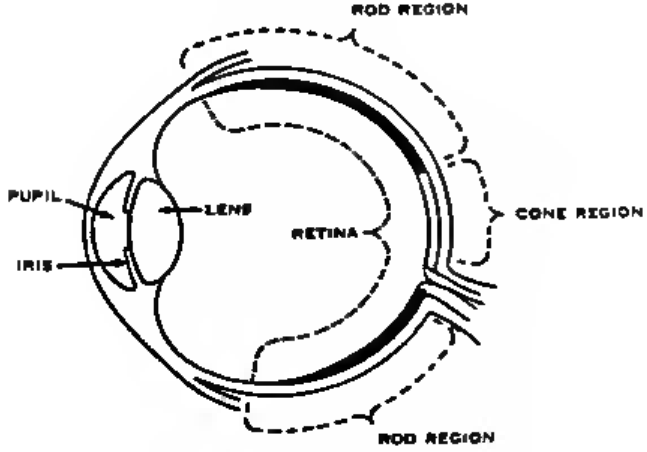


4-5-1

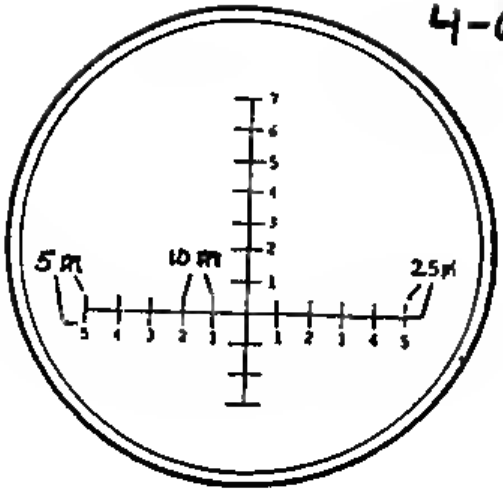

1,800 METERS
600 METERS
400 METERS
200 METERS
SNIPER'S POSITION


DIAPHRAGM
LENS
FILM

4-5-2

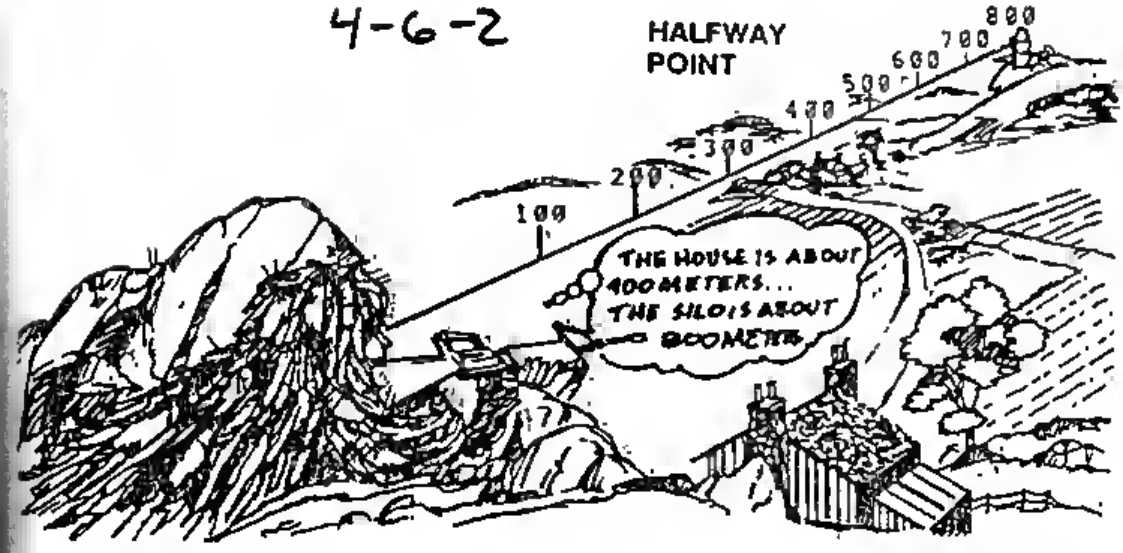

ROD REGION
PUPIL
LENS
RETINA
CONE REGION
IRIS
ROD REGION

4-6-1

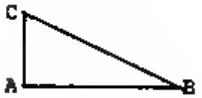


M19 binocular reticle.

4-6-2



SAMPLE PROBLEM #1. Base line length is 20 meters.



Angle B = 1,560 mils

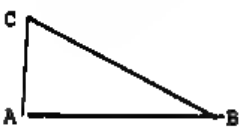
C = 3,200 mils - (A + B)
C = 3,200 mils - (1,600 + 1,560)
C = 3,200 - 3,160
C = 40 mils

$$AC = \frac{(AB) \times \sin B}{\sin C} \qquad AC = \frac{(20) \times \sin 1{,}560}{\sin 40}$$

$$AC = \frac{(20) \times .9992292}{.0392598} \qquad AC = \frac{19.984584}{.0392598}$$

AC = 509.03 meters

SAMPLE PROBLEM # 2 Base line length is 30 meters.



Angle B = 1,585 mils

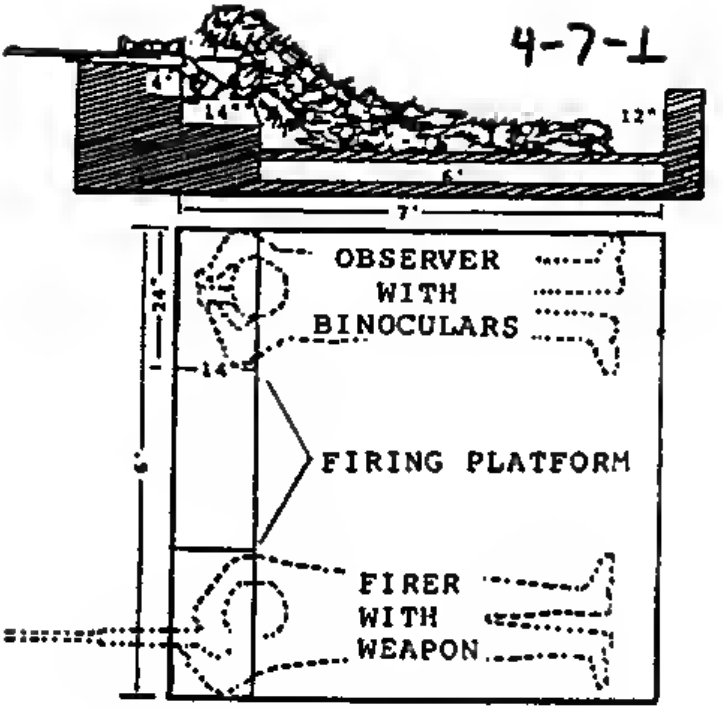
C = 3,200 mils - (A + B)
C = 3,200 mils - (1,600 + 1,585)
C = 3,200 mils - 3,185 mils
C = 15 mils

$$AC = \frac{(AB) \times \sin B}{\sin C} \qquad AC = \frac{(30) \times \sin 1{,}585}{\sin 15}$$

$$AC = \frac{(30) \times .9998915}{.014725} \qquad AC = \frac{29.996745}{.016725}$$

AC = 2037.13 meters

4-7-1



Expedient position.

4-7-2

Figure 4-35. Belly Hide (Side View).

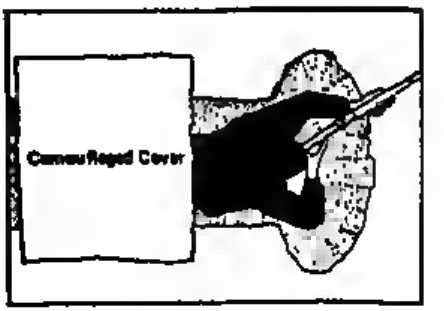
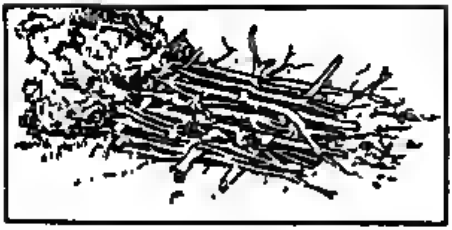
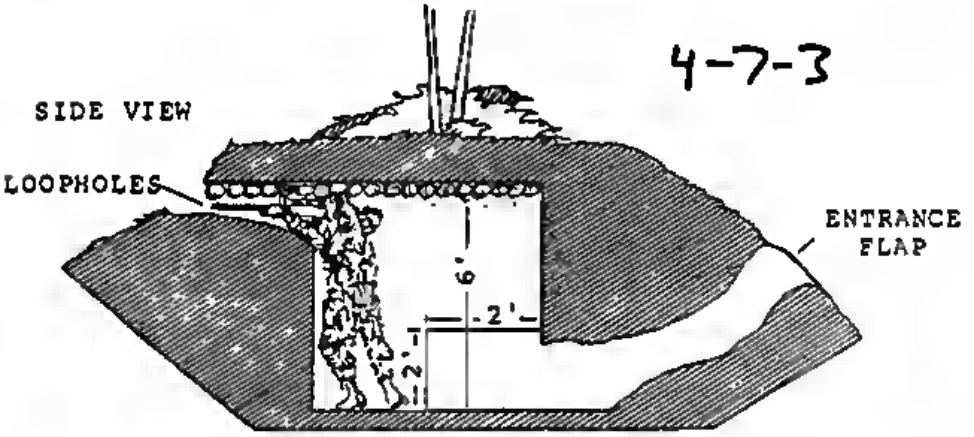


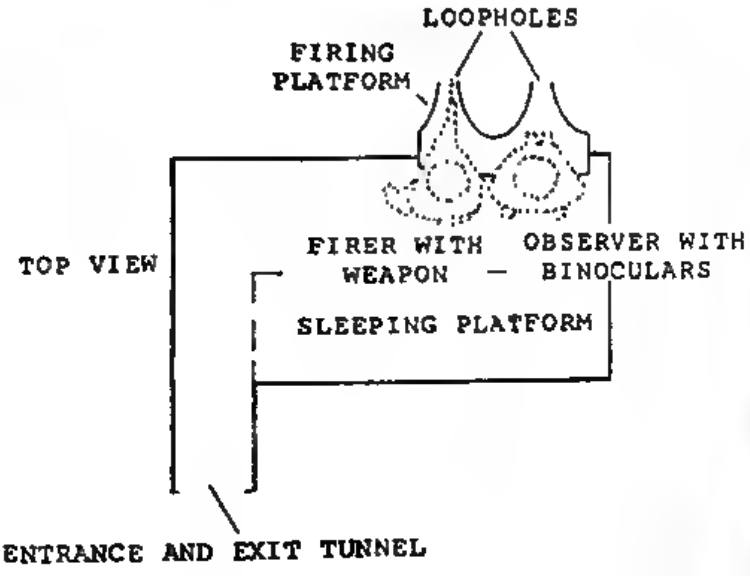
Figure 4-36. Belly Hide (Top View).

4-7-2



4-7-3


SIDE VIEW
LOOPHOLES
ENTRANCE FLAP
6'
2'
2'


LOOPHOLES
FIRING PLATFORM
TOP VIEW
FIRER WITH WEAPON
OBSERVER WITH BINOCULARS
SLEEPING PLATFORM
ENTRANCE AND EXIT TUNNEL

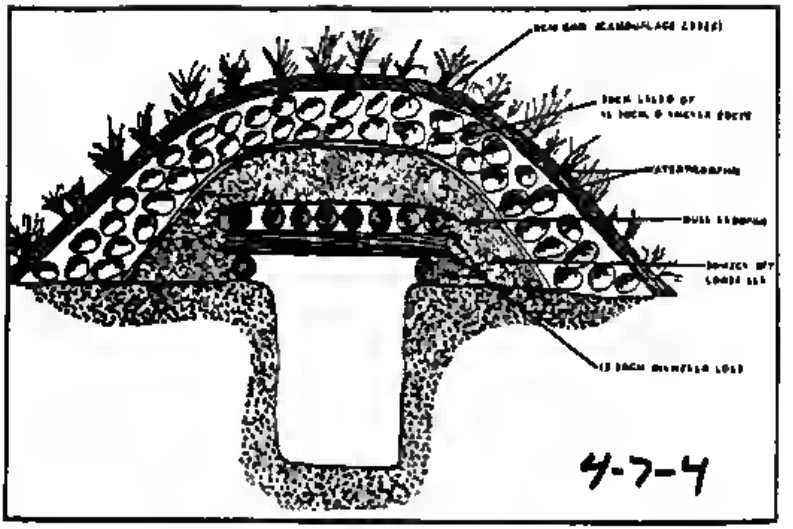


Figure 4-34 Overhead Cover

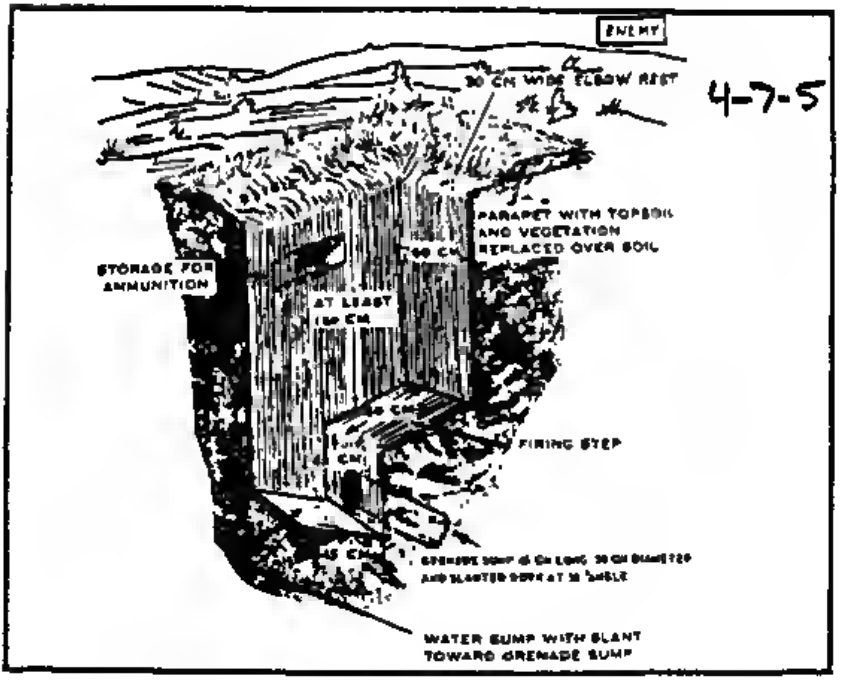
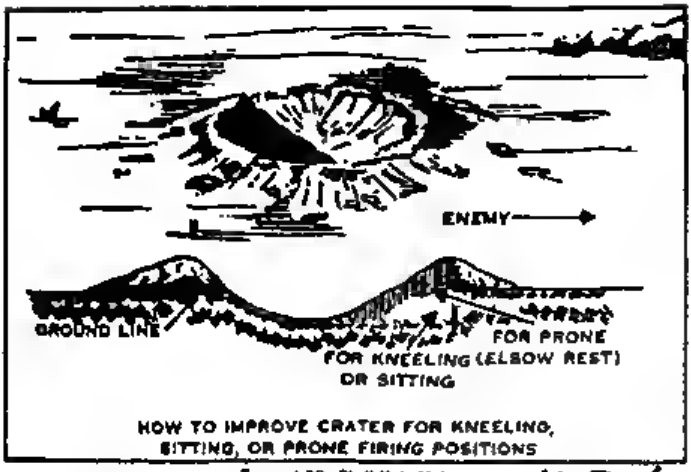


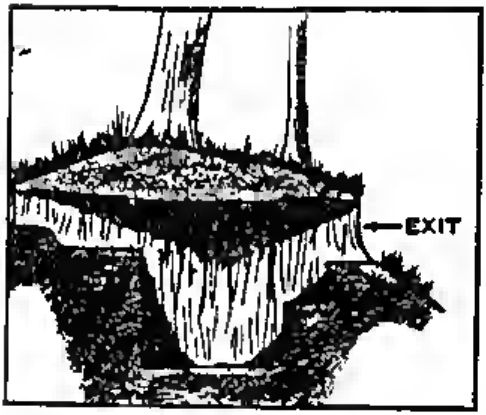
Figure 4-32. Elbow Rest.



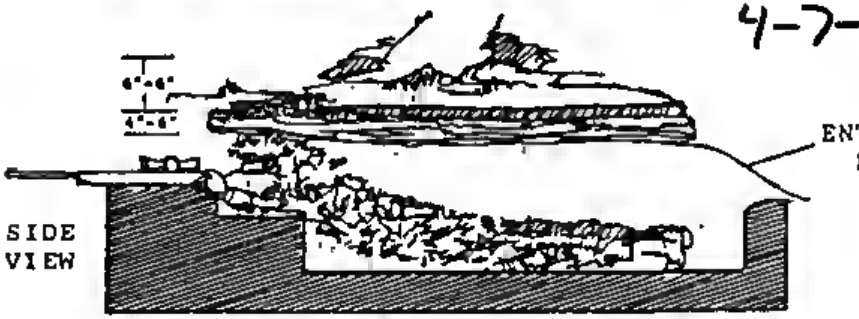
HOW TO IMPROVE CRATER FOR KNEELING, SITTING, OR PRONE FIRING POSITIONS

Figure 4-39. Shell Hole Hide.

4-7-6

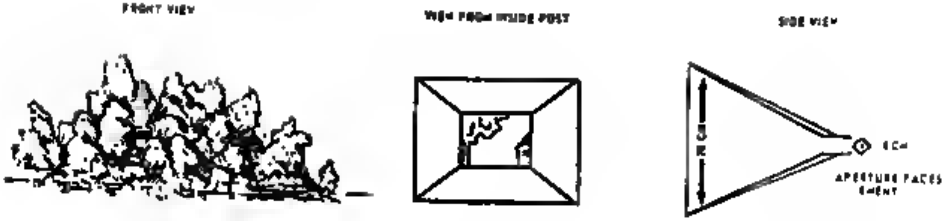


4-7-7

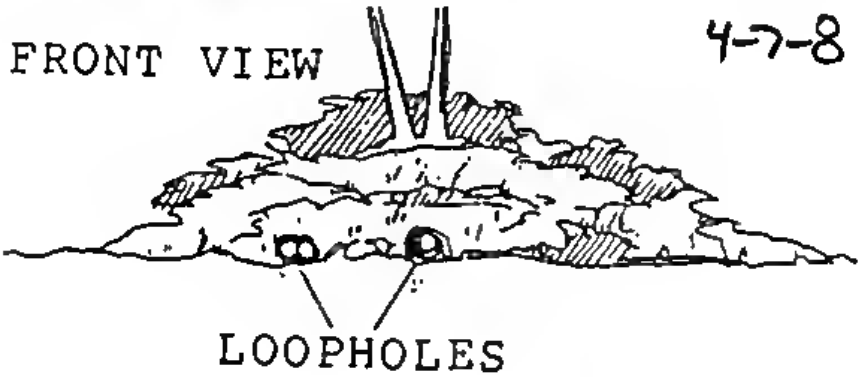


TYPICAL LOOPHOLE CONSTRUCTION

4-7-8



4-7-8



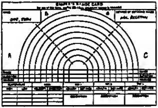
4-8-1

SNIPER'S RANGE CARD

LAST NAME	FIRST	MI	RANK	SSN	UNIT
Doe	John	R	PFC	123-45-6789	B-2/29

DA FORM 2787-R

4-8-2



DA FORM 5787-R

4-8-3

SNIPER'S OBSERVATION LOG SHEET 1 OF 1 SHEETS

[illegible]

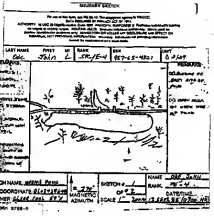
LAST NAME / FIRST / MI	RANK	SSN	UNIT
Doe John R	PFC	123-45-6789	[illegible]

ORIGINATOR	DATE/TIME	LOCATION
Doe, John	1 Oct 91	[illegible]

SERIAL	TIME	GRID COORDINATE	EVENT	ACTION OR REMARKS
1	[illegible]	[illegible]	Occupied Position	[illegible]
2	[illegible]	Same	PFC Jodson [illegible]	None
3	[illegible]	Same	PFC Jodson assumed observation duties	[illegible]
4	[illegible]	Same	[illegible]	[illegible]
5	[illegible]	Same	Prepared Range Card, and topographic sketch	[illegible]
6	[illegible]	[illegible]	[illegible] crossed bridge going south	[illegible]
7	[illegible]	[illegible]	Prepared sketch of bridge [illegible]	Complete
8	[illegible]	[illegible]	[illegible]	End of mission

DA FORM 5786-R

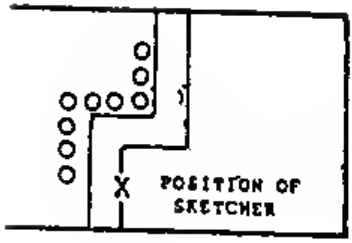
4-8-4

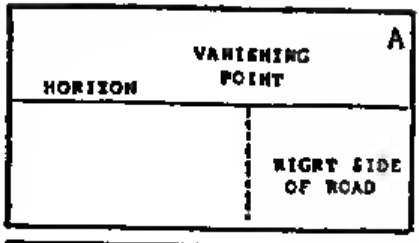

MILITARY SKETCH
LAST NAME
FIRST
MI
RANK
SSN
UNIT
REMARKS
SKETCH NAME
GRID COORDINATE
WEATHER
MAGNETIC AZIMUTH
SKETCH #
SCALE
NAME
RANK
DATE/TIME
DA FORM 5788-R

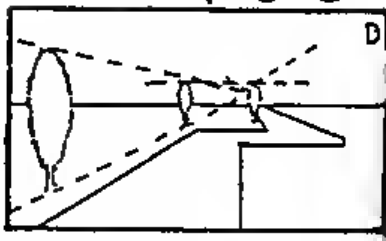
4-8-5

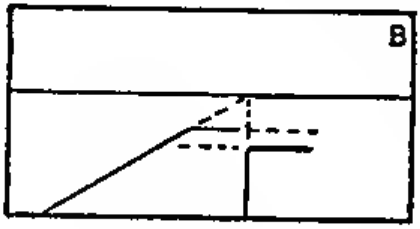

MILITARY SKETCH
LAST NAME
FIRST
MI
RANK
SSN
UNIT
REMARKS
SKETCH NAME
GRID COORDINATE
WEATHER
MAGNETIC AZIMUTH
SKETCH #
SCALE
NAME
RANK
DATE/TIME
DA FORM 5788-R

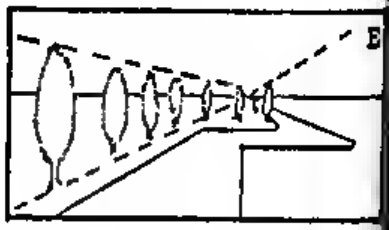
4-8-6

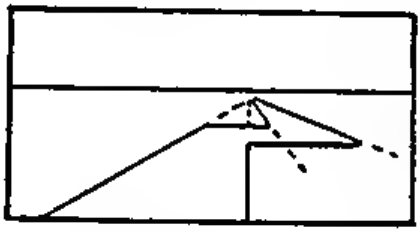


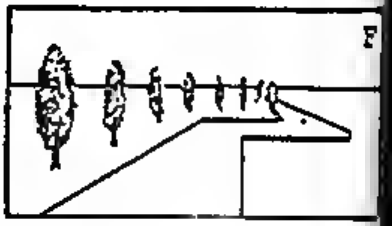


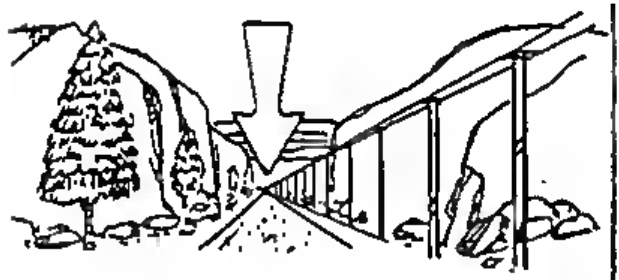






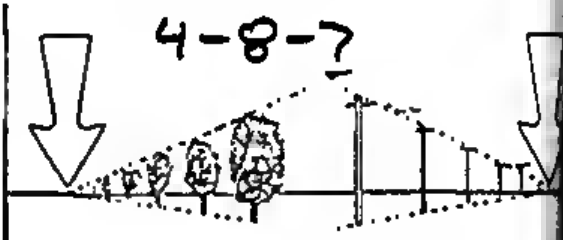




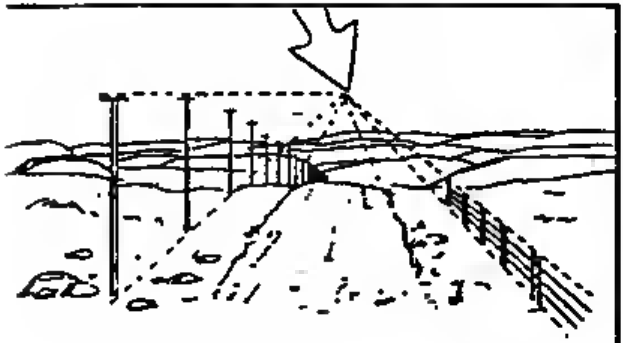


VANISHING POINT BELOW HORIZON

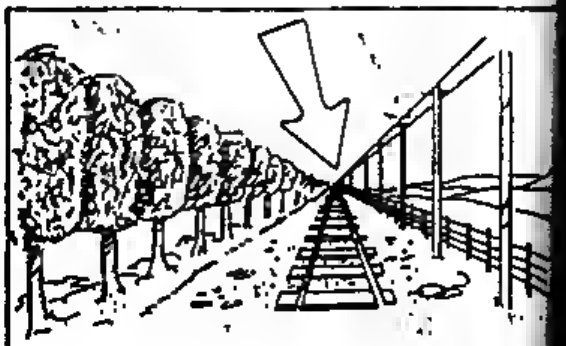
4-8-7



VANISHING POINT LEFT AND RIGHT

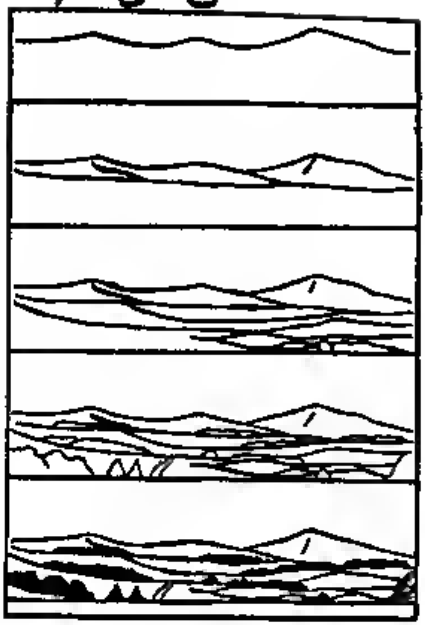


VANISHING POINT ABOVE HORIZON

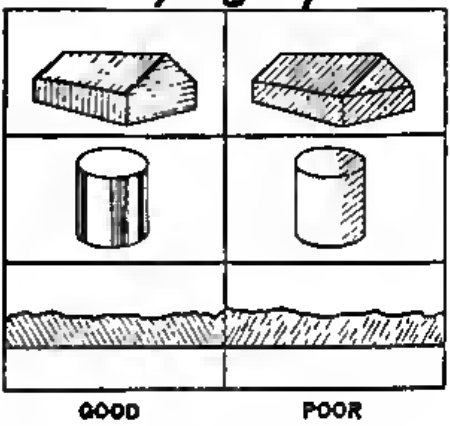


VANISHING POINT ON HORIZON

4-8-8



4-8-9



6-3-1

6-3-2

Chapter 5

EMPLOYMENT

Specisl operations snlper employment ls complex. When employed intelligantly, aklllfully, snd with originslity, the spscial operations sniper will provide s pay-off fsr greater than would be expected from the asaets used. For this to happen, though, the planner must have more than s bssic knowladge of the snlper weapon systam. He must understand the capabilitiea snd limitations of ths spscisl operatlons sniper. However, sniping ia sn individusl talent and aklll that variea with esch individual aniper. This compounds the planner's chsllenge, but thaae variablea can be minimized with csrsful plannlng. The apecial operationa aniper, when properly trsined and employed, csn be one of tha epacial operstlon forcea' most veraatile weapon ayatems.

5-1. EMPLOYMENT CONSIDERATIONS

Methods of Employment

Tha aniper plannar muet apply methode of lntardiction in relation to tha naceesery targat end the deairad affecta againat it. The amployment of SO enipera genarally fella into aavaral diatinct categoriaa:

o Surveillance and reconnaissance. Sniping, by natura of ita axecution (atealthful movament, infiltratlon, uea of long-ranga optica, and limitad-vlalbility operatlona), ie cloaely relatad to raconnaiaaanca and aurveillance. Tha tachniquaa a aniper uaaa to hunt a targat ara aimller to thoaa tha ecout uaaa to conduct aurvaillenca--only the end reaulta era dlffarent. In addition, human intelligence (HUMINT) collactlon la a aacondary function to aniping. Operational plannera ahould rafrain from amploying anipsrs in aolely HUMINT rolea but ahould take advantaga of the HUMINT function when poaaible. Combining both functiona would be analogous to ueing a long-rsnge guard: the sniper providea naeded informstion and csn intercede if necesaery.

o Point interdiction. A point lnterdiction ia eaaantislly hunting a specific tsrget. The SO sniper can interdict both personnsl and material point targeta in support of SO missiona in all levela of conflict. Such missions tend to be complex and msy require: difficult infiltrstion; preclae navigstion to the target; evasion of anemy forces; the broaching of sophiaticated aecurity systams; snd external miaaion support systems (safe houaea, special intelligence, etc.). Normally, the more complex the tsrget or the more protected it is, the greater the degree of aophistication requirsd to defeat it. For instance, s protected personnel targat may require detailed intelligence and a highly akillad sniper for

successful interdiction. Point interdiction also includes shooting situations like those encountered in counterterrorist situations.

o Long-range harassment. Sniper harassment differs from point interdiction in its objective--the sniper's goal being to interdict targets for the purpose of impeding, destroying, or preventing enemy influence in a particular area. Snipers normally conduct harassment at extended ranges to take advantage of their ability to engage targets at distances beyond the enemy's small arms fire. This normally means the sniper will not engage targets closer than 400 meters--100 meters beyond the common effective-fire range of conventional small arms. Long-range harassment is not intended to be decisive; creating psychological fear in the enemy and restricting his freedom of action are the sniper's primary goals. The sniper has the greatest latitude of employment in harassment missions. He can often engage opportunity targets at his discretion but always within the constraints of the mission. This may include harassment of specific kinds of targets to disrupt key functions such as C2 procedures. In some situations, the sniper can afford to engage targets at extreme ranges and risk nonfatal or missed shots. This maximizes harassment by interdicting more targets.

o Security operations. Snipers can provide long-range security in order to deny an enemy freedom of action in a particular area. The sniper security mission can take the form of a series of mutually supporting sniper outposts or cordons. An example of security operations where snipers proved invaluable was during the USMC operations in Beirut, Lebanon when Marine snipers were interwoven with traditional defenses and proved to be effective in long-range protection of local US facilities and interests. Security and cordon missions normally entail static, defense-like operations. However, with the austere firepower of sniper teams and their inability to maneuver in defensive warfare, they are vulnerable to becoming decisively engaged. Therefore, security operations are best integrated into conventional security and reaction forces to help snipers increase their defensive capability. Without such support, the sniper can easily be suppressed and maneuvered upon with fire and maneuver tactics.

Employment Planning

When employing snipers, operational planners must consider many factors. Tactical planning considerations of primary concern to the sniper include hide selection, deception plans, movement techniques, and so forth. However, the operational planner must consider sniper employment from an even higher level of operational perspective. They must realize that snipers are a unique weapon system and possess entirely different attributes from conventional forces, among which, (and the one most frequently misunderstood) is the sniper's firepower. Unlike conventional small arms fire that emphasizes volume, the sniper's firepower emphasizes precision. Sniper fire is most effective when combined with a mind that can exploit long-range precision. A two-man sniper team can deliver

only limited volumes of fire, and no matter how accurate, the volume will seldom equal that of even the most austere military units. If employed incorrectly, the sniper easily becomes just another soldier on the battlefield--except that he is handicapped with a slow-firing weapon.

The sniper's unique employment considerations should be guided by the following considerations:

o Stand-off. Employment should be built around the sniper's ability to engage targets at extended ranges. The maximum effective range will vary with each sniper. However, planners can establish nominal engagement ranges based on the sniper's ability to group his shots into a specified aree or shot group. This measurement can, in turn, be applied to specific targets. The sniper should be able to keep his fire within two minutes-of-angle (2 MOA) shot groups under simulated combat conditions. (The MOA is a universal measurement of shot-group size and is calculated by multiplying the MOA times the range in meters to equal the group size in inches. For example, 2 MOA times 500m equals 10 inches; therefore the sniper would be expected to group his shots within a 10-inch circle at a range of 500m).

The application of group size is important for determining maximum stand-off in relation to target size. For planning, SO snipers should be expected to provide instant incapacitation (non-reflexive impact) shots on personnel to 200m; personnel interdiction with 100 percent probability to 600m on stationary targets; and 70 percent probability to 900m. Engagement of more complicated targets, such as those moving or in adverse environmental conditions, depends on the individual snipsr's skill, his willingness to take risks, and his weapon's capability. Sniper employment planning should take into account the probability of error against the risks incurred if the shot misses. Such analysis will help determine the minimum stand-off range for a reliable chance of a hit on the target.

o Deception. The sniper's most critical tools are his deceptive talents, including all aspects of his deception operations from infiltration to movement within the target area. To planners, deception is also important for operational needs. The SO sniper may use a weapon from another country in order to duplicate that weapon's characteristic signature (ballistic characteristics, cartridge case, bullet, and so forth) for cover. Operational deception may be centered around infiltrating the target area using a clandestine (concealed) sniper weapon. Operational deception may also require plausible deniability of the operation and possibly lead the enemy to believe the target damage was the result of normal failure, accident, or some other form of sabotage. With such interdiction requirements, the sniper can employ special weapons and munitions and aim for vulnerable points to purposely obtain such results. (Such targets include those that

tend to burn, detonate, or self-destruct when shot.) However, this kind of deception is not possible with many targets and is especially difficult to conceal in personnel interdiction. Deception also means a sniper can seldom fire more than once from any location as the sound of shots (even suppressed) is increasingly easier to locate with repetition. (This concept differs greatly from many media and war stories, where the sniper engages his enemy on a protracted basis from the same location--firing shot after shot with apparent impunity.) In reality, snipers locked in decisive duals with enemy forces and firing defensively will normally lose as sniping seldom succeeds in such situations. Planners should refrain from employing snipers in missions that will not allow deception or concealment after firing.

o Operational security. The sniper's use of tactical deception is often his only real security. Employment planners must consider security from operational aspects of the mission when using snipers. These include infiltration means, communications procedures, and methods of command and control. These procedures are important because the sniper must remain covert prior to interdiction to assure success. Normally, once the sniper fires, he is no longer covert and must rely on other plans to facilitate escape. Many environments may permit sniper employment, but few allow plausible denial for the sponsor or operation after interdiction. In other words, such covert operations may be easy to perform, but the risk of compromise, no matter how small, may overshadow the mission. Missions to collect information concerning another country's hostile intentions may themselves provoke serious repercussions if discovered. Moreover, using snipers will assuredly indicate an alternative motive to actually interdicting a target--which could compromise the mission even more.

o Time. The sniper's mission normally requires more time than conventional operations. Because the sniper normally moves on foot with stealth, his only defense is that of remaining unseen. If the sniper has not been given enough time to execute the mission, he may hurry and unnecessarily compromise the mission or fail to reach the target.

o Team employment. Special operations always employ snipers in a team of two qualified snipers, because two-man employment has proven much more successful than single-sniper employment. Teams provide limited security for self-protection, allow near-continuous operations, yet are small enough to allow concealment for execution. In practice, one sniper fires while the other observes. The sniper-observer identifies and selects targets, adjusts the sniper-shooter to environmental factors, provides security, and helps correct missed shots. However, the greatest advantage is the sniper-observer's detachment from the firing process, leaving the sniper-shooter to concentrate on the act of shooting. In other words, the act of shooting does not complicate the sniper-observer's decision process--a task requiring

total concentration. Mission needs may alao require anıpera to be amployed as part of a larger force or in multiple anipsr teama to engage the same tsrget. Both tschniques of employment csn enhsnca the sniper'a affect; however, the besic aniper team should always be retained.

o Terrain. The terrain characteristics for any given area are extremely importsnt to the anıper's mission. Some areaa, such ss those that sre densely wooded, tightly compartmented, or heavily vegetated, are not suitsble for sniper employment becauae they reduce the aniper's sbility to employ the full stand-off cspability of hia weapons system. The threat can quickly suppress anipera thst engage tsrgets inside their minimum stand-off envelope (usually 400m). Moreover, reatrictive terrsin offers the threat cover and concealment in which to maak his attsck against the anıper.

o Innovation. A sniper'a most important attributa is his ability to improvıae. The operationsl plsnner muat alao be innovative in the planning proceaa. Tha anipar ia a weapon of opportunity, not ona to be employed aa a matter of couraa. Plannsra muat activaly aaek mıaaıona and opportunitiea in which to spply tha anipar'a unique attributaa of long-range preciaion rifla fira and concealmant. Often the anipar'a greatest handicap ia tha plannar'a inability to fully axploit hia potential becauaa of tha plannar'a lack of familiarity with the anıpar'a trua role and capability. Staff officera with littla practical aniper experianca or lacking innovative thought will navar be able to fully axploit aniping capabilitiaa.

5-2. ORGANIZATION

Organizational grouping of anipers above the aniper-taam laval ia normally sccompliahed through expedient pooling of anipsr pairs into lsrger organizstions. Such centralizad grouping of aniper asaets can provs benaficial to their employment for apecific miaaiona. In sll cases, centralized control should bs msnsged by the aniper specialiat within the unit. Regardleas of any provisionsl or temporsry aniper grouping, sniper teams ahould not be split; they sre beat employed in the pairs in which they have trained, with sll members being fully qualified snipera.

The level at which sniping ia orgsnized snd msnsged directly influences the ability of aniping to provide direct or ınsirect support to friendly operations. Centralized organizatıon and management of sniping provides a great degree of flexibility regarding deployment. This permits anipers to be deployed to aress or locations where they sre moat needed. Snipers are deployed where they will have the grestest influence on the enemy and provide the maximum possible support to friendly operatıons.

The orgsnizstion of sniper teams will magnify their effectiveness sgsinst the enemy. Sniping, like any other supporting arm, is sn individual specialty requiring independence of action to achieve its grestest potentisl effect on the enemy Requiring special organizstion, snipers may be orgsnized into tsams, squads, sections, and plstoons.

Sniper Tesm

The base element of sny sniper unit is the sniper team, which consists of two equally trsined snipers. When organized into s tsam, snipers are able to:

- Provide mutusl security.
- Engage targets more rspidly.
- Lengthen their durstion of employment.
- Diminish atrsss.

Sniper Squad

A snipsr aquad is compoaed of thrsa to four anipar teams and is locstad at company level. The orgsnization of the anipar aquad is aa follows:

- Squad laadar
- Aaaiatant aquad laader

Command alamant

- Sanior aniper
- Junior aniper

Two to thras anipar taams

Tha miaaion of the aniper aquad ia to aupport the operationa of tha company. The company ia the loweat laval at which aniping can be csntrslizsd and atill maintsin operational affectiveneaa. Sniper teama ahould not be attached to the tsctical aubunits of the compsny.

Sniper Section

The misaion of the sniper saction ia to directly or indirectly support ths combat operationa of s battalion's aubordinste units. In direct support, sniper teams are sttached to company headquarters slsments ss needed, snd employment considerationa are identical to thoss of compsny sniper teams. In indirsct support, sniper teams sre sssigned ssctors of reaponaibility as psrt of the bsttalion fire plsn. The sniper aection ia sttschsd to the battalion headquartars S2/S3, snd the aection commander would act as ths battalion aniper coordinator. The aniper ssction is compoaed of 8 to 10 aniper teams and consists of:

- Section commander

Command element

- o Assiatant aection commaader
- o Armorer

Support element

- o Radıo operator

- o Senior aniper

Operational team(s)

- o Junior aniper

Snipar Platoon

The mission of a aniper platoon is to support regiment/brigade combat and intelligence operationa independently or by attachment to regiment/brigade aubunita. When attached, sniper aquads should remain intact and ahould be attached no lower than battalion level. The aniper platoon ia compoaed of a platoon leader, a platoon aargeant, a radiotelephona oparator/driver, an armorer, and three sniper aquada conaiating of a aquad leader and fiva two-man aniper taama. Tha anipar platoon falla under diract oparational control of the ragimant/brigade intelligance officer or indirect control through liaiaon with the anipar platoon leader. Sniper platoon oparationa may include daap penatration of the enemy raar araaa, atay-bahind operationa, and raar area protection.

5-3. COMMAND AND CONTROL

Command and control of anipera ia accompliahad uaing indirect and diract control procedurea. Thaaa procadurea complement tha anipar'a aalf-diacipline in axacutiag hia asaigned miaaion. Tha aniper taam will often oparata in aituationa where diract control methoda will not be poaaible. Therefore, tha anipar must prosacute hia miaaion, within tha parametera of the commander's intent, on peraonal initiative and determination. Thia ia a major reaaon (in the aniper-aelection procaaa) why personnel with motivation and aelf-determination are required aa anipera. Without these peraonal traita, the sniper'a decentralized execution allows total diaregard for the miasion and ita complation. In other words, he can go out to parform a miaaioa aad merely "lay low" until time to return.

Indirect Control of Snipers

Commandera can accompliah iadirect control of snipera through a variety of methoda, the aimpleat being rules-of-engagement (ROE) and fire control measurea. Even with atrict direct control (voice radıo, wire, and ao forth) of aniper teams, commanders should establish ROE and fire control to maximize flexibility, and to prevent unnecessary engagements. The ROE will normally designate combatant forces and situatioas that will allow the sniper to angage the enemy.

One significant problem with contemporary ROE is the restrictive measures used in low-intensity conflicts. Often, such ROE will specify enemy personnel as only those presenting a direct threat to friendly forces or requiring verbal warning prior to engagement. The paradox is that a sniper's modus operandi is to engage targets that are not a direct threat to him (outside small arms effective fire range) at the moment, but which later may be. To stay within the guidance of the ROE is extremely difficult for the sniper, as once the enemy gets within the sniper's minimum stand-off, the conflict can become one of close-quarters battle, and a twelve-pound, scope-sighted sniper rifle is no match for an AK-47 or M-16 at close quarters--despite the fact that it may be a semiautomatic rifle. Therefore, ROE for snipers must provide for the sniper's safety by adding security forces or by removing him from the operation.

Fire control measures are just as important for the sniper as they are for indirect-fire weapons and aircraft. As with any long-range weapons system, positive target identification is difficult at extended ranges--even with the advanced optics the sniper will carry. Establishment of no-fire zones, fire coordination lines, and free-fire zones will help in sniper command and control by establishing guidelines for when and where the sniper can fire.

Direct Control of Snipers

Direct control of SO snipers can be accomplished through the use of technical and nontechnical systems, including radio and wire communications. In some circumstances, direct control means may include commercial telephones or other nontraditional tactical forms of communications. The exact methods of control, technical or nontechnical, will be determined by the mission and the operational environment.

Nontechnical control of snipers is accomplished through the use of prearranged methods including rendezvous, message pick-ups and drops, and other clandestine methods of secure communications. In denied areas, or those with electronic interception capabilities, these methods may be the only secure techniques for communicating with the sniper teams. These systems, although often quite secure, tend to be slow and require more elaborate procedures for execution.

Snipers can also employ many forms of technical communications systems such as radio and wire. Both radio and wire offer near-instant message traffic and facilitate command and control with two-way communications. Radio is a common method of communications for most sniper missions; it is responsive and provides real-time control and reporting capabilities. In addition, radio (voice, burst, satellites) allows the mobility snipers require for their mobile-employment methodology. The major advantage to radio is its ability to transmit mission changes, updates, and intelligence in a timely manner. However, when properly arrayed, enemy-direction

finding assets can determine the location of even the most focused and directional transmissions. To avoid this, SO must use specialized communications techniques and procedures But even then, the deployed teams will still have the problem of transmitting from their location to confirm messages or send data

The major drawback to radio communications is the transmitter's electronic signature. In the case of the SO sniper's operational environment, enemy detection of any electronic signature can be just as damaging as reception of a message Once the enemy is aware of the sniper's presence (through spurious transmissions), it becomes an academic problem to hunt him down. Even with successful evasion from efficient threats (for example, scent- and visual-tracking dogs), the sniper team will be preoccupied with escape and evasion instead of the target. Of course, this can also be an objective--to divert enemy internal security forces to a rear-area sniper threat.

Wire communications can provide protection from enemy deception, jamming, and interception. Static security operations, defensive positions, and extended surveillance posts are suitable for the use of wire communications However, the disadvantages of wire must also be calculated--time to emplace, lack of mobility, and relative ease of compromise if found by the enemy. When possible, wire communications should be backed up by more flexible forms of control, such as radio.

Certain environments, such as found during foreign internal defense and counterterrorism missions, may allow for more flexible technical communications techniques. For example, the use of commercial telephones may be more appropriate than traditional military communications. In addition, many of these environments possess a low threat from actual message interception or direction-finding assets, allowing the sniper team more liberal use of the radio. However, planners would be wise to remember the time-tested proverb--never underestimate your enemy.

Coordination

There must be meticulous coordination with both supported and unsupported units that fall within the sniper team's area of operations. This coordination is the primary responsibility of the sniper coordinator. Coordination with supported and unsupported units includes:

- Nature, duration, and extent of local and extended patrols.
- Friendly direct and indirect fire plans.
- Local security measures.
- Location and extent of obstacles and barrier plan.

- Rendezvous and/or linkup points.
- Passage and re-entry of friendly lines.
- Unit mission and area of responsibility.
- Routes and limits of advance.
- Location and description of friendly units.
- Communication plan.

While it is important that the sniper team receives as much information as possible to ensure mission success, the sniper coordinator must not give the team so much information that, in the event of capture, the entire sector would be compromised. This demands that everyone involved: the sniper team, the sniper coordinator, supported and unsupported units in the area of operations, all communicate and remain "coordinated."

Once coordination is initiated, control measures to protect the sniper and the supported and unsupported friendly units must be planned. Also, in the event of a situation change, there must be a recall capability to prevent the sniper team from being subjected to undue danger. The sniper team must also be advised of friendly operations in their area that could subject them to friendly fire. The snipers must be allowed enough latitude within these controls to avoid decisive engagement with the enemy by remaining mobile, elusive, and unpredictable.

Support Relationships

Sniping is a combat support activity. As with any other forms of support, sniping should be used to augment only those units that have a specific need for it. Sniping provides either indirect or direct support. Deployed as HUMINT assets, snipers indirectly support friendly units and operations. Direct support is of two types:

- Operational control. Snipers are under the operational control (OPCON) of the supported unit only for the duration of a specific operation. After completion of the mission they return to the control of the parent unit. This is the optimal method of supporting operations, as it is flexible and efficient toward the unit to which the snipers are attached.

- Attachment. For extended operations or distances snipers may be attached to a specific unit. The unit of attachment assumes control of sniping for the duration of attachment. The sniping specialist/coordinator should also be attached to advise the unit on assignment of proper employment methods. If it is not possible to attach the sniper coordinator, then the senior and most

experienced sniper on the attachment orders must assume the job as sniper coordinator for the period of attachment. The receiving unit must also be made aware of the status of the sniper coordinator and the importance of his position. Normally, attachment for extended periods will include supply and logistical support to the sniper element from the unit of attachment.

Planning, coordination, and control are also dictated by the support given to the unit and by the support received from the unit. Support given to a unit can be classified into four broad types:

(1) Offensive operational support.

(2) Defensive operational support.

(3) Retrograde operational support.

(4) Special operations.

5-4. TARGET ANALYSIS

There are two general classes of sniper targets: personnel and material. These targets can be further categorized as either of tactical or strategic value. Tactical targets have local, short-term value to the current battle or situation. Tactical personnel targets for the sniper are normally of enough significance to warrant the risk of detection when firing. Such targets include: enemy snipers, key leaders, scouts, and crew-served weapon crews. Tactical material targets are of particular importance to the war effort or operation.

Strategic personnel targets are not as well-defined as tactical personnel targets because of problems with the concept and definition of assassination. The definition of assassination versus the elimination of a military target is a complex problem unrelated to the scope of this manual. Strategic materiel targets consist of all types of objects of a military nature, including components or systems within a target (such as a turbine in an aircraft).

Target Systems and Critical Nodes

SO snipers should be directed at the enemy's C2 facilities and the critical nodes supporting them. Snipers can frequently regard targets as being in an interrelated system; that is, any one component may be essential to the target's entire operation. These interrelated, and essential, components are known as critical nodes. Critical C2 nodes are components, functions, or systems that support a military force's command and control. These will differ for each target, but they will generally consist of the following:

o Procedures. Snipers can easily interdict the procedures, routines, and habits the enemy uses to conduct operations. Of most significance, snipers can create fear in the enemy which will cause him to take extreme measures in security or to modify procedures to keep from being shot. The enemy may curtail certain functions, divert assets for security, or restrict movement in his own rear areas to prevent interdiction.

o Personnel. Personnel targets are critical, depending on their importance or function. The target does not necessarily need to be a high-ranking officer but may be a lower-ranking person or a select group of people, such as a skill or occupational group, who are vital to the enemy's war-fighting apparatus.

o Equipment. Equipment is critical when the loss of it will impact the enemy's conduct of operations. Seldom will singular equipment targets be so critical as to impact the enemy in any significant fashion. However, targets or components that are not singularly critical may, collectively, be vital to the enemy. Common targets include objects common to all other similar targets or systems vulnerable to interdiction, such as a particular component (a radar antenna) which is common to many other radars. Interdicting only one antenna would have limited effect; it would merely be replaced. However, interdicting every possible radar antenna would significantly impair the enemy's logistics.

o Facilities. Facilities include activities and complexes that support the enemy's operations or C2 functions. In the larger context, snipers are not suited for such interdiction. However, where possible, the sniper can focus on critical elements, such as C2 nodes or logistic capabilities, of the larger facility (power generation system or transportation equipment, for example).

o Communications. The most fragile components of C2 systems are often the communications nodes, which include all the systems providing information to the enemy. Snipers can usually interdict these nodes because they are easily recognizable and, frequently, quite vulnerable. Attacking other targets, not critical in some fashion, serves no purpose in the employment of SO snipers and only wastes resources without a definable objective. Target analysis helps determine which critical nodes to interdict and predict how effective the sniper will be.

Target Analysis

Target analysis includes selecting the appropriate method to use against a target. This includes aircraft, a strike force, snipers, etc. In doing so, the planner can match the sniper's capabilities to the potential target. Sniper capabilities include using special weapons and performing covert execution of operations.

Attacking targets by sniper fire requires detailed planning and coordination; SO sniper targets should not be attacked indiscriminately. Interdiction must be conducted within the parameters of the assigned mission from higher headquarters, the desired results of the interdiction, the target's vulnerabilities, and the priorities of interdiction (on multiple targets or components.)

The target analysis system used considers the target's criticality, accessibility, recuperability, vulnerability, effect, and recognizability (CARVER). The CARVER analysis process is a generic model for special operations interdiction missions. It is also suitable for sniper interdiction, particularly during materiel interdiction planning, which is similar to interdiction with special munitions or demolitions. Sniper fire can be applied within the framework of the CARVER model to better determine if sniping would be the appropriate interdiction method, and precisely how and where to apply it. The CARVER analysis is applied to sniper interdiction based on the following criteria:

- Criticality. A target is critical in relation to the impact its destruction would have on the enemy. The mission order will largely determine critical targets. However, within a target system there may be components that may be critical for the operation of the entire target. For example, a turbine is a critical component of a jet aircraft. The concept of attacking a critical component (using accurate fire) allows the sniper to engage a much greater variety of targets than commonly accepted.

- Accessibility. Accessibility to a target is based on how readily the target can be attacked. For the sniper, target accessibility includes getting through the target's security system (security police or intrusion detectors) and knowing what the reaction will be to the sniper's stand-off interdiction. Accessibility for sniper interdiction is unique, because the sniper can frequently engage targets without violating security systems, which, in turn, reduces the enemy's ability to detect the sniper before the interdiction.

- Recuperability. The recuperability of a target is measured in the time it takes the target to be repaired, replaced, bypassed or substituted. The concept of recuperability is essential to sniping. Frequently, planners think only in terms of total destruction as opposed to a lesser degree of destruction. Frequently, however, the same effect can be achieved by simply shutting down the target or destroying one vulnerable component. The advantage of interdiction short of total destruction is in the application of force; complete destruction normally requires a more elaborate force and more units. In addition, the ability to control target destruction with precision fire can prevent unnecessary damage or limit adverse effects to systems on which the

local populace may depend for electrical power, food, water, and so forth.

o Vulnerability. A target (or component) is vulnerable to the sniper if he haa the weapons and skill required to interdict the critical points that the target analysis has identified. The key to target vulnerability ia identifying the weakest critical link in the target aystem and destroying it.

o Effect. The effect of interdiction includes a wide range of results incident to the interdiction. Target effect is the desired result of attacking the target, including all possible implications--political, economic, and aocial effects of the interdiction. Occasionally, the planner muat decide what the desired effect ia; it may be the removal of key peraonnel, the paychological impact of the interdiction, or the threat of interdiction.

The fear of interdiction is evident in tha Garman attempts to kill Churchill in World War II, which forced him to ramain hidden for periods of time. Conversely, John M. Collin'a book, Green Berets, SEALs, and Spetsnaz, deteil the political implicationa of a direct-action miaaion to kill e figure auch aa Emperor Hirohito of Japan, tha "amperor-god", during World War II. Such action, Collina, atataa, would have had an adverae impact by rallying tha Japanaaa paople. A aimilar reaction waa aeen when the US bombad Libya in 1986. During tha raid, US bombs aerioualy injurad one of Colonel Muammar Qaddafi'a children and reaultad in nagative media and intarnational backlaah. (Deapita Qaddafi'a own unscrupulous acta, andangering hia family waa unacceptable to the intarnational public.)

Matarial target intardiction by aniper fire ia much mora limitad than it ia with peraonnel targets. Tha SO aniper'a abilitiea might ba anhanced by hia choice of apacial weapons to interdict matariel targets, but he might atill be limited by the relative vulnerability of the target. Tha greatest obatacla for aucceaaful interdiction of materiel target resta primarily with the identification of the vulnerable nodea. The goal of the aniper'a fire on theae nodes is to be aa effective aa more powerful weapona--using preciaion fire at kay points inatead of brute force in the general area.

o Recognizability. A target ia recognizable if it can be effectively acquiaitioned by the aniper. A target may be well within the sniper'a stand-off range but cannot be effectively engaged becauae the target ia maaked or concealed. For example, the sniper's recognition of targets using night-vision equipment might be restricted because of the technological limitations of the device. Positive identification of targets, as well as small target componenta, ia difficult given the characteristics of the phosphor screen in night-vision devices. Other factors

complicating recognizability include the time of day, light conditions, terrain masking, and environmental factors.

5-5. MISSION PLANNING

Successful accomplishment of a sniper mission relates directly to the planning and preparation that takes place.

Levels of Mission Planning

The two levels of mission planning are above-team level and team level. At above-team level the sniper employment officer (SEO) or sniper leader is responsible for planning and coordinating the actions of more than one sniper team. This is done with the intent of having several teams carry out coordinated or independent missions toward the same objective. At team level the two members of the sniper team will carry out the planning, preparation, and coordination for the mission. Therefore, warning orders are not necessary at this level, and the sniper operation order itself is a mission planning tool.

Sniper Operation Order (OPORD)

1. SITUATION

A. Enemy Forces.

1). Weather. Light data, precipitation, temperature, effect on the enemy and the sniper team.

2). Enemy. Type unit(s), identification, training, presence of countersnipers, significant activities, and effect on the sniper team.

3). Terrain. Terrain pattern, profile, soil type, vegetation, effect on the enemy and the sniper team.

B. Friendly Forces. Adjacent units, left, right, front, and rear. Since sniper teams are vulnerable to capture, they should not be given this information. Rather, they should be given information such as the location of free fire and no fire zones.

2. MISSION

Who, what, where, when, and WHY. The WHY is extremely important for the sniper to successfully accomplish this mission and future missions. The sniper must understand the importance of taking the life of the target.

3. EXECUTION

A. Commender'a Intent. This paragraph relates specifically whet ia to be sccompliahed, in a ahort, precise atatement. This should include the Commander'a meaaure of auccesa.

B. Concept of the Operation. This parsgrsph relates step by step how the mission will be carried out. This is best done by breaking the mission down into phases. Specific taska will be carried out in each phase, usually starting from infiltration to exfiltration.

C. Fire Support. Normally in a deep operation, fire aupport will not be svsileble. However, in other aituetions, the sssets may exist.

D. Follow-on Miaaiona. Thia paregreph will outline sny follow-on missions that msy be needed. Once the primsry mission is accomplishsd, ths sniper tesm may be csllsd upon to csrry out another mission in the eres of operation (AO) before exfiltrstion. This may conaiat of snothar aniper misaion or s link-up with snothsr teem, s unit, or indiganous paraona ea s mesns of sxfiltrstion.

E. Coordinsting Instructions. Consists of the following:

1). Actions st ths objsctivs. This psrsgrsph contsins spscificsily ths dutiss of ssch member of ths tssm snd thsir rotstion to includs:

s. Sscurity.

b. Sslaction and construction of tha hida.

c. Rsmovsl of spoils.

d. Csmouflsgs and fields of firs.

e. Ohserver's log, rsnge card, snd militery sketch.

f. Placement of equipment in the hide.

g. Maintenance of weapons and equipment.

h. Ohaervstion rotation.

2). Movement techniques. This psrsgrsph will cover the movement techniques, security st halts, snd responsibilitiea during movement to snd from the ohjective rsllying point (ORP) snd the hide snd during the return trip.

3). Route. This psragraph covers the primary and alternate routes to and from the ohjective area. It may also

include the fire support plan if it is not covered in the fire support annex.

4). Departure and reentry of friendly positions. This is normally used in the support of conventional units, but it could be used when dealing with indigenous persons, such as during a link-up.

5). Rally points and actions at rally points. This can be used in some instances, but for a two-man element a rendezvous is much more advisable. For example, several rendezvous points en route should be preplanned with a specific time or period for link-up. This is done so that movement is constantly toward the objective, preventing the lead man from backtracking and wasting time.

6). Actions on enemy contact. Avoid contact; do not engage in a firefight. It is best to avoid contact, even in an ambush; evade as best as possible. Do not attempt to throw smoke or lay down a base of fire. This only calls attention to your position, and soon the enemy will be pursuing you with a much larger element. In the event of an air attack, hide. It is not possible for a two-man element to successfully engage an enemy aircraft. You will only call attention to your position if you try to engage the aircraft.

7). Actions at danger areas. Avoid danger areas by moving around them, unless this is not possible or time is critical. When moving across large open areas, stalk across; do not move in an upright posture. Linear danger areas are best crossed by having both team members move across the area at the same time to avoid splitting the team in case of enemy contact.

8). Actions at halts. Security is critical even when taking a break and nobody is expected in the area. Stay alert.

9). Rehearsals. If time is not available, at the minimum, always practice actions at the objective. During rehearsals, practice immediate action drills (IADs) and discuss actions at rally and rendezvous points. Know their locations and your routes on the map.

10) Inspections. Inspect each other's equipment. Use a checklist for equipment and ensure that everything works. Ensure that you have the proper equipment and camouflage for the terrain and the environment you will be encountering.

11). Debriefing. This paragraph covers who will attend the briefing, where the briefing will be conducted, and when the debriefing will take place. This is where the observer's log and military sketches find their use, as information-gathering tools.

12). Priority intelligence requirements (PIR)/information requirements (IR). These requirements are passed down to the sniper team as information that should be gathered when the team is employed.

13). Annexes. This section contains specific maps and sketches showing items such as routes, the fire support plan, the tentative ORPs, and the hide sites.

4. SERVICE SUPPORT

This paragraph covers, but is not limited to, administrative items such as:

A. Rations.

B. Arms and ammunition that each team member will carry.

C. Uniform and equipment that each team member will carry.

D. Method of handling the dead and wounded.

E. Prisoners and captured equipment. This paragraph is not likely to be used, unless the equipment can be carried, photographed, or sketched.

F. Caches, mission support sites (MSSs).

5. COMMAND AND SIGNAL

A. Frequencies and call signs. It is not necessary to list all the frequencies and call signs. You need only to refer to the current Communications-Electronics Operating Instructions (CEOI).

B. Pyrotechnics and signals, to include hand and arm signals. It is best to have a team standing operating procedure (SOP) to which you can refer. Otherwise, you must list all the pyrotechnics and hand and arm signals.

C. Challenge and password. The challenge and password will be necessary when linking up at rendezvous points and passing through friendly lines.

D. Code words and reports. This refers to any contact made with higher headquarters or possibly a link-up with indigenous persons.

E. Chain of command.

Terrain Profile

A terrain profile is an exaggerated side view of a portion of the earth's surface between two points. The primary purpose is to

determine if line of sight is available. Line of sight is used to determine:

- Defilede positions.
- Dead space.
- Potentiel direct fire weapon positions.

A profile can be constructed from any contoured map. Its construction requires the following steps:

- Drew e line from where the profile begins to where it ends.
- Find the higheet end loweat value of the contour lines that croas or touch the profile line. Add one contour value above the highest and one below the loweat to take care of hills and valleys.
- Select a piece of notebook paper with as meny linea as contours on the profile line. The standard Army green pocket notebook or any paper with quarter-inch lines is ideal. If lined paper is not available, draw equally spaced lines on a blank sheet.
- Number the top line with the highest value and the rest of the lines in sequence with the contour interval down to the lowest value.
- Place the paper on the map with the linea parallel to the profile line.
- From every point on the profile line where a contour line, a stream, an intermittent stream, or a body of water crosses or touches, drop a perpendicular line to the line having the same value. Where trees are present, add the height of the trees to the contour.
- After all perpendicular lines have been drawn and tick marks placed on the corresponding elevation line, drew a smooth line connecting the marks to form a horizontal view or profile of the terrain.
- The profile drawn may be exaggerated. The space of lines on the notebook paper will determine the amount of exeggeretion.
- Draw a straight line from the start point to the finish point on the profile. If the straight line intersects the curved profile, line of sight is not available.

<u>Sunriee/Suneet Overlay</u>

A sunrise/sunset overlay (SSO) is a graphic representation of the angle to the rising and setting sun and the objective. An SSO enables a team to plan a line of advance or tentative hide sites to take best advantage of the light. An SSO requires a table showing the true azimuth of the rising sun and the relative bearing of the setting sun for all months of the year. An SSO is constructed in the following manner:

- Using the projected date of the mission and the latitude of the target, determine the true azimuth of the sunrise from Table 5-5-1.

- Using a protractor and a straightedge, draw a line from the objective along the true azimuth.

- Subtract the true azimuth from 360 to find the sunset azimuth.

- Using a protractor and a straightedge, draw another line from the objective along the sunset azimuth.

- Convert each azimuth to a back azimuth and write it on the appropriate line.

- Label the appropriate lines SUNRISE and SUNSET.

- Write down the latitude and the date that was used to construct the overlay.

5-6. SPECIAL FORCES MISSIONS/COLLATERAL ACTIVITIES

Special Forces Missions include:

- Unconventional Warfare (UW)
- Foreign Internal Defense (FID)
- Direct Action (DA)
- Special Reconnaissance (SR)
- Counterterrorism (CT)
- Security Assistance (SA)
- Humanitarian Assistance (HA)
- Antiterrorism/Security Activities
- Counternarcotics (CN)

- Search and Rescue (SAR)
- Special Activities
- Deception Operations
- Demonstrations and Shows of Force

Effects of SO Sniper Operations on Civil Affairs and Psychological Operations

Civil Affairs (CA) and civic action programs sponsored by friendly organizations can be adversely affected if sniper interdiction is misused. The sniper is a very efficient killer, and given a target, the sniper will go to extreme efforts to interdict it. Therefore, planners must temper the use of force with common sense and the future goals of the operation. It may be easier to eliminate threats than to negotiate, but in the long run, negotiations may open the door for settlment where sniping may close it or may set the stage for undesirable reactions.

Planners must also consider the psychological operations (PSYOP) aspects of the mission, including both positive and negative impacts. The sniper can project not only accurate weapons fire but tremendous psychological destruction. Such impact was given as rationale for the Viet Nam Mai Lai massacre. There, in defense of their actions, some soldiers claimed that enemy sniper fire (and friendly casualties) over a protracted period of time drove them to commit the war crimes. On the other end of the spectrum, US use of snipers can also cause adverse reaction on enemy forces. As at Mai Lai, the enemy may focus on innocent noncombatants and commit inappropriate reprisals in response to intense sniper pressure. This is especially true in unconventional warfare and foreign internal defense environments where US special operations forces may use local populations as guerrillas and security forces.

The psychological impact of sniping has received little attention in the overall scheme of war. Historians often focus on the large weapons systems and overlook the stress and fear that sniping adds to the battlefield. Yet, this psychological impact can ruin the fibre and morale of an entire army, much like that which occurred in World War I where the sniper's bullet was often feared far more than many other ways of dying.

Only recently in US history has the military recognized the psychological impact of sustained combat, although the sniper has always contributed as much to fear as he has to fighting. Operational planners may consider this PSYOP capability when planning sniper missions, especially when using PSYOPs in unconventional warfare where it plays a vital role.

5-7. UNCONVENTIONAL WARFARE

Unconventional Warfare (UW) is a broad spectrum of military and paramilitary operations, normally of long duration, predominantly conducted by indigenous or surrogate forces who are organized, trained, equipped, supported, and directed in varying degrees by an external source. UW includes guerrilla warfare (GW) and other direct offensive low-visibility, cover, or clandestine operations, as well as the indirect activities of subversion, sabotage, intelligence collection, and evasion and escape (E&E)

Sniper Employment in UW Operations

The primary mission of the SO sniper in UW is to organize and train the resistance force into an effective fighting force. The primary mission of the resistance force is to support conventional forces during times of war.. Therefore, the SO sniper must know conventional sniper tactics as well as unconventional techniques in order to effectively train a US-sponsored resistance force. During peacetime, training of foreign military or paramilitary forces may be accomplished by mobile training teams (MTTs). In times of war, the training would take place during the organization/training phase of the resistance force after linkup.

The importance of a sniper in UW cannot be measured alone by the number of casualties he inflicts upon the enemy. Realization of the sniper's presence instills fear in enemy troops and influences their decisions and actions. Selective and discriminate target interdiction not only instills fear in the enemy, but can lead to general confusion and relocation of significant enemy strengths to counter such activity.

In UW and FID roles, the SO sniper can perform both as a fighter and a trainer. Not only can he teach sniper skills to the force he is training, he can act as a direct-action asset when needed. The sniper's ancillary skills in camouflage, stalking, surveillance, and deception are also useful in UW and FID environments. The impact of these talents is magnified when the sniper is employed as a trainer. By training others he is, in effect, performing interdiction much more efficiently than he could alone.

Unconventional warfare or guerrilla warfare is characterized by three major phases: build-up, consolidation, and link-up. Snipers will play an important role in all three phases.

Build-up.

During initial contact and build-up SO snipers will be mainly involved in training the indigenous force snipers and then acting as sniper coordinators.

During the build-up snipers are extremely effective when used in the harassing and sniper ambush role. By utilizing the snipers'

ability to deliver long-range precision rifle fire, the UW force can accomplish several objectives all at once: the snipers will be able to strike at the enemy forces while minimizing their own exposure; they will deny the comfort of a secure area to the enemy; they will build UW force morale with successes while minimizing the amount of UW force exposure; and since the fires are discriminatory, the effect on the civilian population should be mainly positive, as civilian casualties will be minimized.

It is, however, very important that the snipers go after targets with a military objective only. The line between sniper ambush and assassination at this point can be blurred. It must be remembered that an ambush is for military gain, while an assassination is for political gain. Assassination, under any guise, is illegal and against Presidential Executive Order 12333, Part II, para 2-11, dtd 4 Dec 1981.

During the end of the build-up and prior to the consolidation phase, the UW force snipers will be used the same as strike operations snipers, that is, in support of small raids and ambushes. As the size of the UW force grows, so will the size of the missions that are similar to strike missions.

Consolidation.

During consolidation, as the UW force becomes larger, the role of the sniper reverts to that of the conventional sniper. The same missions, tactics, and employment principles apply.

Link-up.

During link-up and after, the snipers' role will mainly become that of security force snipers and rear area protection force snipers. The UW force snipers will be particularly suited for this role. They have spent their time in that area and should know most, if not all, of the main areas that could support the enemy during infiltration and rear area attacks.

During the initial contact phase of a resistance movement, sniper employment will normally be limited to supporting small-unit operations and will include such actions as:

o Harassment of enemy personnel. When performed at ranges greater than 500 meters, harassment serves to lower the enemy's morale and inhibit his freedom of movement.

o Infiltration. Prior to an attack, snipers may infiltrate enemy units' positions and establish themselves in the enemy's rear area. During the attack the infiltrated snipers engaged specific targets of opportunity in order to divert the enemy's attention from the attacking units and to disrupt his freedom of movement in his rear areas.

o Interdiction. The snipers will delay or interdict reinforcing elements to a target and deny the enemy use of an area or routes by any means.

o Sniper ambush. This is the use of multiple sniper teams operating together to engage targets by timed or simultaneous fire. A fixed number of rounds will be fired by each sniper, and the ambush will be terminated when either the targets have been successfully engaged or the predetermined number of shots have been fired. Planning considerations must include how the ambush is to be initiated, how the snipers will communicate with each other, and what methods the snipers will use to engage the targets

o Security and surveillance. Snipers are employed to gather information or to confirm existing intelligence by long-term surveillance of a target site, or they may be used to provide early warning of impending counterattacks. Snipers will normally establish a hide position to conduct their surveillance.

o Offensive/defensive operations. During the advanced stages of the combat phase of a resistance movement, snipers may be used to detect and shoot long-range targets that could impede the progress of the offense.

o Defensive operations. Snipers are best used in defensive operations outside the forward line of troops (FLOT) to provide early warning of the approaching enemy, disorganize his attack, and cause him to deploy early. Snipers may also be used to delay the enemy's advance by interdicting enemy movements using a series of interlocking delay positions, thus allowing the friendly forces to withdraw.

Sniper Element Organization in UW and FID

When organizing sniper elements in a UW or FID role, the sniper elements must be organized above team level with elements under the control of the commander and the S2, as the scout or recon platoons are. Depending upon the availability of trained personnel, the sniper elements should be organized as a squad at battalion level (10 men or five teams) and as a platoon at regimental or brigade level. The regimental level must have a sniper coordinator, and this is also desirable at battalion level. The sniper coordinator should be assigned to the S2/G2 staff for intelligence purposes; however, he must work closely with the S3/G3 staff for planning purposes. The sniper coordinator should be a sniper-qualified senior NCO, warrant officer, or officer who is well versed in mission planning. He must also be forceful to ensure that the sniper teams are not improperly deployed. All other members of the squads, the platoon, and the platoon headquarters element must be sniper qualified

5-8. FOREIGN INTERNAL DEFENSE

Foreign Internal Defense (FID) is the participation by civilian and military agencies of a government in any of the action programs taken by another government to free and protect its society from subversion, lawlessness, and insurgency. The primary SF mission in this inter-agency activity is to organize, train, advise, and assist host nation military and paramilitary forces.

Sniper Employment In FID Operations

The primary role of SO snipers in FID is the same as in UW, primarily that of a teacher. During the passive FID role, SO snipers will be in-country for the purpose of training and advising only, and will not have an active role. During active FID, the SO snipers could find themselves in both a trainer's role and an active role. In either case, passive or active, the primary tactics will be that of conventional warfare: offense, defense, and withdrawal.

During active FID, the SO sniper will conduct the following missions: counter-guerrilla operations, sniper cordons/periphery OPs, sniper ambushes, urban sniper hides, and civil disorders.

Counterguerrilla operations. One of the primary means to accomplish this mission is to employ snipers in rear area protection (RAP). Snipers are used to enhance the protective measures surrounding sensitive facilities or installations by setting up observation posts along routes of access, acting as part of a reaction force to rear area penetration, or patrolling the area (as members of established security patrols). The role of the sniper in RAP operations includes protecting critical installations and sites, covering gaps between units to avoid infiltration, preventing removal of obstacles, and tracking enemy patrols known to have penetrated into the rear area.

The sniper's ancillary skills in camouflage, stalking, surveillance, and deception are also useful in the FID environment. The impact of these talents is magnified when the sniper is employed as a trainer. By training others he is, in effect, performing interdiction much more efficiently than he could alone.

When organizing sniper elements in a FID role, the sniper elements must be organized above team level with elements under the control of the commander and the S2, as the scout or recon platoons are. Depending upon the availability of trained personnel, the sniper elements should be organized as a squad at battalion level (10 men or five teams) and as a platoon at regimental or brigade level. The regimental level must have a sniper coordinator, and this is also desirable at battalion level. The sniper coordinator should be assigned to the S2/G2 staff for intelligence purposes; however, he must work closely with the S3/G3 staff for planning purposes. The sniper coordinator should be a sniper-qualified senior NCO, warrant officer, or officer who is well versed in mission planning. He must also be forceful to ensure that the

sniper teams are not improperly deployed. All other members of the squads, the platoon, and the platoon headquarters element must be sniper qualified.

5-9. DIRECT ACTION

DA operations are short-duration strikes and other small-scale offensive actions by SOF to seize, destroy, or inflict damage on a specified target or to destroy, capture, or recover designated personnel or materiel. In the conduct of these operations, SOF may:

- Employ direct assault, raid, or ambush tactics.
- Emplace mines and other munitions.
- Conduct standoff attacks by fire from air, ground, or maritime platforms.
- Provide terminal guidance for precision-guided munitions.
- Conduct independent sabotage.

SF DA operations are normally limited in scope and duration and have a planned exfiltration. They are designed to achieve specific, well defined, and often time-sensitive results of strategic or operational significance. They usually occur beyond the range (or other operational capabilities) of tactical weapons systems and conventional maneuver forces. DA operations typically involve the:

- Attack of critical targets.
- Interdiction of critical LOC or other target systems.
- Capture, rescue, or recovery of designated personnel or material.

The major type of DA operations include:

- Raids against strategic objectives or targets that have a high tactical value or are time-sensitive in nature.
- Seizure of key facilities.
- Interdiction of major lines of communications (LOCs).
- Recovery operations.
- Deception operations.

- Show-of-force operations.

Sniper Employment in DA Operations

When employed in direct action missions, snipers will perform one or more of the following four functions:

- Harassment. Deliberate harassment of the enemy through sniping is designed to impede, destroy, or prevent movement of enemy units. The degree of harassment depends on the amount of time and planning put into the operation. Harassment is best suited for protracted or unconventional operations. During such operations sniper casualties will be high, and provisions for their replacement must be included in the harassment plan.

- Sniper ambush. The term "sniper ambush" refers to the use of multiple sniper teams operating together to engage targets by timed or simultaneous fire. A fixed number of rounds are fired by each sniper, and the ambush is terminated either after the targets have been successfully engaged or after the predetermined number of shots has been fired. Planning considerations important to the sniper ambush include how the ambush will be initiated, how the snipers will communicate with each other, and how targets in the kill zone will be engaged.

- Sniper cordon. A sniper cordon is a series of outposts surrounding an area in a general or a specific location. A sniper cordon is designed to prevent the enemy from entering or leaving a target location. Snipers may be employed in cordon operations by being integrated into the overall fire plan as a supporting force or in cordon areas as independent elements. During cordon operations snipers should be employed so as to maximize their precision long-range fire capabilities. Due to the snipers' limited volume of fire and reliance on stealth, they possess little capability to become decisively engaged during such operations. Once the snipers have been located, they may be suppressed by fire and maneuver and/or indirect fire. Therefore, the snipers' ability to hold or cordon an area will be directly commensurate to the enemy force encountered and the support from friendly units.

- Interdiction. Interdiction is preventing or hindering enemy use of an area or route by any means. When deployed for the purpose of interdiction, snipers are emplaced to interdict dismounted avenues of approach. The snipers' ability to interdict vehicular traffic would be limited to harassment unless armed with large caliber sniper weapons systems. Snipers can be deployed with vehicular interdiction elements to harass the enemy when he is forced to dismount.

Sniper Employment in Strike Operations

Strike operetions sre normally limited-scope operations with s planned exfiltration. Using snipers in strike operetions depends largely on the operetion's scope and objectives. Often strike operetions consist of sn overt, forced infiltration and overwhelming firepower to suppress the tsrget area. In such cases, using snipers should be weighed sgsinst the requirements for suppressive fire. Automatic wespons msy provide better long-range suppressive fire--only in volume. However, snipers can use semiautomatic sniper weapons to provide accurate long-range suppressing and interdicting fire, wbicb is especially edvantageous when weight, colletersl structursl damage, end threats to noncombatents sre concerns. Given the nature of direct-action operations, it is difficult to imagine s strike operation in which snipers could not contribute in some way.

Elemsnts of the Strike Force

The size of the atrike force will depend on the mission, locstion of the terget, snd enemy situstion. A striks force is tailored in size snd cspebility to perform s specific mission; the forcs csn bs s smsll tssm to intsrdict a psrsonnel tsrgst, or a lsrger forcs to destroy s lsrgs fscility or plsnt. Rsgardless of size, most strike operstions consist of commsnd, security, support, snd sssault elemsnts. Snipsrs csn provide support to sny of these slsmsnts depending on ths objsctivea snd nesds of the commsnder. Ths rsquiremsnts for ths SO aniper in striks opsrstions msy be spplisd ss follows:

o Command element. Ths command elsmsnt forms the primsry commsnd post snd is normslly composed of ths striks force commsndsr snd, ss s minimum, his S2/S3 snd firs support slsment controllsrs. Ths snipsr coordinstor should slso bs sssigned to the commsnd slsmsnt. The snipsrs sssigned to ths command element srs formsd by ths axpedisnt pooling of striks forcs snipera under ths control of tha sniping spscialist. Regsrdlsss of their origin, poolsd snipsrs are kspt in their originsl tesms. Centrslized undsr the command elsment, snipers will be sbls to conduct reconnsissssnce snd direct-sction missions supporting the entirs strike force or multipls missions supporting ons or more strike force elements throughout the operation. Exemples of specific sniper missions under centrslized control of tbe command element include: reconnoitering the objective rslly points, routes, snd/or exfiltration sites; rsconnoitering snd observing the objective (once ection is initieted, covert OP snipers may perform s direct-ection function in support of the strike force); establishing s reserve to intervene or rsinforce elements with precision rifle fire; and screening danger erees snd vulnersble flsnks or sealing off the enemy rear.

o Security element. The security element's mission in strike operations includes securing rslly points; providing early warning of enemy approach; blocking svenues of approach into the objective srea; preventing enemy escspe; and acting as left, right,

and rear security elements for the strike force. Snipers may be employed in conjunction with a larger security force or independently in support of the security mission. This employment will generally be determined by the scope of the strike operation and personnel constraints.

In smaller operations the security element may be made up in part or entirely by the snipers, which would reduce personnel requirements. In larger operations a larger, more flexible (anti-armor, demolitions, etc.) security force will normally be required. In this regard, snipers would serve to complement the security element's capabilities. For example, armored threats require augmentation by appropriate antiarmor weapons. Snipers can provide accurate long-range suppressive fire to separate infantry from their armored units and to force tanks to "button-up" which will hinder their ability to detect the launch of wire-guided missiles. The sniper team can employ large-bore sniper weapons to help delay and interdict light materiel targets.

Snipers performing security missions in strike operations are particularly well suited to perform successive or simultaneous missions in addition to providing early warning of, delaying, and harassing reaction forces. Reaction forces located some distance from the objective will approach using vehicles or air. The mobility assets of the reaction force can be dedicated to that mission and can subsequently present an actual threat to the strike force. Snipers may be employed a part of the security force to interdict or harass reaction force avenues of approach or landing zones (if known or obvious).

In addition to the main role of security, the snipers may also be used secondarily to report information prior to the assault, support the assault force by fire (caution must be used here), assist in seeing the objective during the assault, maintain contact after the assault, and act as a rear guard during the withdrawal of the assault force.

o Support element. The support element of the strike force must be capable of placing accurate supporting fire on the objective. The support element must deliver a sufficient volume of fire to suppress the objective and provide cover to the assault element. The support element also provides fire support to cover the withdrawal of the assault element from the objective.

Snipers in the support element provide discriminate fire in support of the assault force. The sniper's optics facilitate positive target identification and acquisition, which allows snipers to fire in close proximity to friendly forces with reduced risk of fratricide. This is opposed to more traditional automatic or indirect supporting fire that must be terminated or shifted as friendly forces approach the target area ("lift and shift"). At night, friendly troops can wear distinctive markings such as

reflective tapes or infrared devices, visible to the sniper's night-vision equipment, to eid identificetion.

When assigned to the support element, snipers should be organized into four-man sniper teams (two pairs working together) There are several reasons for this type of organization. First, the rate and control of the snipers' supporting fire can better be controlled by the eniper teem leader. Second, sniper elements centrally locsted are better able to redeploy to critical locations to delay pursuing forces. Third, limited vsntage points from which to deliver precision rifle fire may exist. Concentrating snipers at these ventege points may be the only effective way to maximize their capabilities of long-renge precision rifle fire

When enipers sre assigned to the support element, the mission thet they will perform ehould be epecific. The effectivenees of eniper fire ie not in the volume, but the preciaion with which it is delivered. Sniper mieeions include: disrupting command end control by sngeging officere or NCOe directing the defenee; euppreeeing guerde end enemy eecurity forcee; providing preciaion covering force to the eeeeult element; deleying pureuing forcee efter withdrawal; end meinteining contect with dieplaced enemy forcee efter the etteck. Thie includee obeerving for enemy counterettecke or continued heresement of the enemy in order to dieorgenize eny counteretteck efforte. One edventege of enipere in the eupport ie thet enipere do not heve to lift end ehift ee crew-eerved weepone do ancs the eeeeult element ie on the objective. The enipsre cen continue to eupport through preciaion rifle firs.

o Assault force. Snipere ere eeldom eeeigned to the eeeeult force, primerily beceuee of the need for rapid movement combined with euppreeeive fire. Thie type of meneuver eeldom ellowe for the enipere' deliberete (eedentery) firing proceee. In eddition, the eeeeult force ie often employed in cloee-quarter bettle--nullifying the enipere' etand-off cepebility. However, snipere cen be essigned to the assault element when commend end control will be bettsr effectsd or in circumetances where the eniper can enhence the assault force'e miesion. They may be attached to the aseault element to provide cover fire when the sssault element must pass through an area that is dead space from other supporting slements. However, the snipers sre then used in the support of the assault element's movement to the objective and are not an actual pert of it.

Enemy Considerations during Striks Operations

o Enemy Security Forces. The type snd number of enemy security forces likely to be manning the tsrget or available for reaction must be considered in the plen. These forces may be static, foot mobile, vehicle mounted, or airmobile. Armored vehicles will generally be positioned on the perimeter, while light vehicles will normslly be loceted in s vehicle park Armored vehicles ere likely to become centers of resistsnce, around which

defenders will concentrate during the action. This will present the snipers with a high density of targets, particularly officers and NCOs who will tend to use static armored vehicles as rally points. The lack of vehicular mobility on the part of the strike force renders them vulnerable to a mobile threat. In such circumstances, snipers should be delegated the task of interdicting routes of access to vehicle parks. Drivers of light vehicles are the primary targets; track or tank commanders are the prime armored vehicle targets.

o On-site defensive positions. Strike targets deep within enemy lines will generally have less protection and a lower defensive posture than those located nearer to the main battle area. Target site defenses can be characterized as either hasty or permanent.

* Hasty defensive positions will be characterized by less protection to defending personnel than prepared ones. Strike force snipers will be able to engage such positions at a greater distance with more effectiveness due to the limited protection to the targets. Snipers should consider any object or location at the target site that affords protection to the enemy (e.g., behind light vehicles or in buildings) as a hasty defensive position.

* Permanent defensive positions will be characterized by bunkers, sandbagged fighting positions, prepared buildings, etc. Such targets present unique circumstances to the snipers. These well-protected targets, which often have narrow firing ports and are mutually supportive, make engagement difficult and require the snipers to approach much closer to the protective targets than normal. As the range to the targets decreases, the probability of detection and engagement from the enemy forces is increased.

o Enemy reaction force. Strike force snipers functioning in a support capacity, or as part of the strike force security element, will be targeted primarily against the enemy reaction force.

5-10. SPECIAL RECONNAISSANCE

Special Reconnaissance (SR) is reconnaissance and surveillance conducted by SOF to obtain or verify, by visual observation or other collection methods, information concerning the capabilities, intentions, and activities of an actual or potential enemy. SOF may also use SR to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area. SR includes target acquisition, area assessment, and post-strike reconnaissance

Special reconnaissance operations are the most complex missions of SOF. In fact, special reconnaissance is so complex that much controversy remains over its very definition. The

problem stems from the operational environments and geographic areas in which special reconnaissance is performed. To a SOF commander in Central Europe, an SR mission may entail infiltration, HAHO parchute operation deep in enemy rear areas to collect information on the movement of a second-echelon front army. To a SOF commander in Central America, the SR team may infiltrate by commercial carrier or on foot to conduct surveillance of a guerrilla force in a rural environment. Simply stated, the circumstances surrounding the mission govern the execution. Special reconnaissance is as much a technique as it is a mission, that technique being to collect information on a target or objective. The execution of special reconnaissance will be prosecuted commensurate to the environment.

Special reconnaissance consists of infiltration (land, air, and sea) into an area to collect target information. Reconnaissance teams (normally four to six men) employ advanced information-collection equipment and have the ability to process some information. In addition, SR missions may require nondescript uniforms and equipment (with appropriate legal overwight) and may employ some type of communications to transmit information if needed. Teams can communicate with secure radio transmission unless the electronic signature presents a compromising threat. If so, the team must establish alternate clandestine communications.

One problem unique to the SR mission is the frequent requirement for the SR team to perform some sort of additional mission other than reconnaissance. The proximity of the SR team to the target often causes planners to add requirements for the team to perform more than reconnaissance. These missions (known as follow-on missions) can take the form of terminal guidance operations to bombing aircraft on a target or of direct intervention by the reconnaissance team itself. The problem with follow-on missions is the overwhelming amount of equipment required. The reconnaissance teams already carry heavy loads for the reconnaissance mission, and the added burden of radio beacons and transponders (used to vector aircraft) consume room in a rucksack that force some other baggage to be sacrificed (food and water often being the victims).

The SO sniper offers some advantages to special reconnaissance missions; he is well trained in surveillance, and his ability to interdict material targets at extended range is often complementary to follow-on SR missions. If interdiction of C2 systems is the goal of the follow-on mission, then snipers can carry much more potential destruction in the form of large-bore sniper rifles than the same number of persons can in conventional demolitions.

Sniper Employment in SR Operations

Surveillance is the systematic observation of areas, places, persons, or things by visual, aural, electronic, photographic, or other means. Snipers make extensive use of fixed and roving

surveillance to acquire targets or assess target vulnerabilities. Snipers will normally establish a hide position to conduct their surveillance. Once they are in the hide, the snipers will prepare an observation log. Information should be described in detail. The observation log will serve as a record of events and assist in mission debriefing. All priority intelligence requirements (PIRs) and information requirements (IRs) will be reported as required.

Reconnaissance is a mission to obtain information about the activity and resources of an enemy or potential enemy or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area. Because of their mission-essential equipment, snipers are ideally suited to perform reconnaissance in conjunction with their primary direct-action mission.

Snipers may be employed to reconnoiter enemy positions that are of specific interest to supported units. Information gathered by snipers includes, but is not limited to:

- Locations of crew-served weapons.
- Gaps in enemy wire.
- Locations and sizes of LP/OPs.
- Gaps between enemy units and positions.
- Locations of infiltration routes.

Snipers may be used to infiltrate through enemy positions in support of offensive operations or to harass enemy rear areas. Once sniper teams have infiltrated enemy positions, they may be employed to report information on:

- Troop strength and movements.
- Concentrations and reserve locations.
- Observation posts and weapons locations.
- Command, control, and communications facilities.

5-11. COUNTERTERRORISM

Counterterrorism (CT) is offensive measures taken by civilian and military agencies of a government to prevent, deter, and respond to terrorism. The primary mission of SOF in this interagency activity is to apply specialized capabilities to preclude, preempt, and resolve terrorist incidents abroad. SOF involvement in CT is limited by HN responsibilities, Department of

Justice (DOJ) and Department of State (DOS) lead agency authority, legal and political restrictions, and appropriate DOD directives. When directed by the National Command Authority (NCA) or the appropriate unified commander, designated SOF units conduct or support CT missions that include:

- Hostage rescue.
- Recovery of sensitive material from terrorist organizations.
- Attack of the terrorist infrastructure.

Because of the very low profile of most terrorist organizations, identifying targets for CT missions can be extremely difficult. While a preemptive strike against terrorists may be preferred, CT missions must often be conducted after the terrorists have already initiated a terrorist incident. For SF, CT is a special mission, not a generic mission applicable to all SF units. SF participation in CT is limited to those specially organized, trained, and equipped SF units designated in theater contingency plans. These designated SF units respond as directed by the NCA or unified commander to resolve specific situations arising from a terrorist incident. As part of the counterterrorist enhancement program (CTEP), these designated SF units may also train selected HN forces to perform CT missions.

Sniper Employment in CT Operations

In CT operations, snipers provide three primary functions:

- They can deliver discriminate fire to interdict hostile targets.
- They can cover the entry teams into the objective area with rifle fire.
- They can provide the CT force commander with his most accurate target intelligence. In this case, snipers are normally positioned to have ideal observation of the enemy. Most frequently, this will be the commander's only view of the target.

Background Information

Counterterrorist operations play a significant role in the world today. Incidents, such as the assassination of President Kennedy, demonstrated to the world how vulnerable even the most protected people are. The notorious Texas Tower Sniper of the mid-60s, Charles Whitman, proved that existing law-enforcement capabilities against snipers were inadequate. In the late 1960s and early 1970s, hostage barricade situations (aircraft and buildings) became commonplace, the growth of sniping (or countersniping as the police prefer to call it) was a logical

reaction on the part of law-enforcement agencies to counteract such threats.

Today there are not only formal police sniper programs (such as those for the Federal Bureau of Investigation, Secret Service, National Rifle Association, and many local agencies), but there are many commercial outgrowths as well. Major firearms companies now market police "sniper rifles" and private literature is replete with material for would-be snipers. Law-enforcement application of sniping coincided with the Vietnam conflict and served to feed the sniper industry.

After Vietnam, for the first time in US history, the US maintained active sniper programs--if only in law enforcement. The military was slower to learn; it abolished almost all of its sniper capability only to have to revive it in the late '70s in response to the demands of modern warfare--low intensity conflicts, terrorist situations, and selected applications in the nuclear age. (Interestingly, the popularity of law-enforcement sniping has diminished significantly since the terrorist bomb has become a more favored terror technique. Bombs are impersonal and efficient--if collateral damage to innocents is of no concern.)

Counterterrorist operations require extensive training and coordination. Most important, the sniper teams must know the plans and actions of the entry teams to avoid possible injury to friendly personnel, and they must fire when told to do so. Failure to engage and neutralize a target can have devastating consequences, as that which occurred in the 1973 Olympic games in Munich, Federal Republic of West Germany, when snipers did not neutralize their terrorist targets on command. The result was that the terrorists were free to exterminate the hostages. To compound the problem, the snipers were so confused that they shot and killed several of their own men. Of course, overzealous snipers can create results similar to what occurred in Los Angeles, California. Police snipers shot and killed a bank present who was indicating a gunman by pointing his finger. The overanxious police sniper thought the man was pointing a gun and shot him. Obviously, the line between shoot and don't shoot is thin and can be stretched thinner by haste of indecisiveness.

Part of the solution to these problems lies in the selection and training process. During the selection process, an individual's mind is the one variable that cannot be effectively measured. In fact, psychologists cannot agree on what traits to look for in a sniper. How does one pick a man to deliberately kill another man who presents no immediate threat to him personally? Unfortunately, the real test of a sniper comes only when it is time to pull the trigger. Only then will the sniper's reliability definitely be known.

Another problem that seems to manifest itself in CT scenarios is what is known as the Stockholm Syndrome. This is the sniper's inability to shoot a person who has become familiar to him. This syndrome manifests itself when the sniper has conducted constant surveillance of his target and becomes so familiar with the target's actions, habits, and mannerisms that the target becomes more human, almost well acquainted--too familiar to shoot. On the other hand, some reports have indicated the opposite to be true; some snipers hope to have the opportunity to shoot someone from some twisted, personal motivation. Perhaps this happened in Los Angeles. Nevertheless, these psychological extremes, eager or reluctant shooters, are inappropriate to the sniper's function; the sniper must be somewhere in-between.

5-12. COMBAT SEARCH AND RESCUE

In Combat Search and Rescue (CSAR) operations, the role of Special Operations snipers is extremely limited, because the mission is intended to rescue and not to interdict. However, SO snipers can provide traditional long-range security and early warning to rescue forces. The sniper's ability to operate effectively in denied areas can greatly assist the rescue forces by providing accurate information regarding the rescue. Snipers can infiltrate before the rescue and conduct surveillance of the rescue area unnoticed. The USAF is considering using snipers with their pararescue units (in place of machine guns) to provide long-range security during rescue operations. This would give them the benefit of selectively interdicting threat targets while not endangering innocent bystanders.

5-13. COUNTERSNIPER

A sniper team is the best asset available to a commander for a countersniper operation. Countersniper operations eliminate the enemy sniper threat. These operations are planned and coordinated by the sniper team. A countersniper operation occurs between two highly trained elements--the sniper team and the enemy sniper--each knowing the capabilities and limits of the other.

A sniper team's first task is to determine if there is a sniper threat. If so, it then identifies information that may be gained from the unit in the operations area, such as:

- Enemy soldiers in special camouflage uniforms.
- Enemy soldiers with weapons in cases or drag bags.
  - Long barrel lengths.
  - Mounted telescopes.

* Bolt-action receivers.

o Single-shot fire at key personnel (commanders, platoon leaders, senior NCOs, or weapon crews).

o Lack or reduction of enemy patrols during single-shot fires.

o Light reflecting from optical lenses.

o Reconnaissance patrols reporting of small groups of enemy (one to three men) by visual sighting or tracking.

o Discovery of single, expended casings, such as a 7.62x54mm Rimmed ammunition.

The sniper team next determines the best method to eliminate the enemy sniper. To accomplish this, the team:

o) Gathers information:

* Time(s) of day precision fire occurrences.

* Location(s) where enemy sniper fire was encountered.

* Location(s) of enemy sniper sightings.

* Material evidence of enemy snipers such as empty brass casings or equipment.

o Determines patterns: The sniper team evaluates the information to detect the enemy's established patterns or routines. It conducts a map reconnaissance, studies aerial photos, or carries out a ground reconnaissance to determine travel patterns. The sniper must consider himself from the enemy position and ask, "How would I accomplish this mission?"

Once a pattern or routine is detected, the sniper team determines the best location and time to engage the enemy sniper. The team can also request:

o Coordinating routes and fires.

o Additional preplotted targets (fire support).

o Infantry support to canalize or ambush the sniper.

o Additional sniper teams for mutual supporting fire.

o Baiting of likely engagement areas to deceive the enemy sniper into commitment by firing.

- All elements be in place 12 hours before the expected engagement time.

During a counteranıper operation, the team must ignore battle activity and concentrate on one objective--the enemy sniper.

When an enemy sniper is operating in a unit's area, the snıper team ensures that the unit employs passive countermeasures to defend against enemy sniper fire:

- Do not establiah routinea--for example, consistent meal times, ammunition reaupply, assembly area procedures, or day-to-day activities that have developed into a routine.
- Conduct all meetinga, briefinga, or gatherings of personnel under cover or during limited vısıbılity.
- Cover or conceal equipment.
- Remove rank from helmeta and collara. Do not salute officera. Leaders ahould not uae authoritative mannerisma.
- Increaaa OPa and use other methoda to increaae the unit'a observation capabilitias.
- Brief patrola on what to look for, auch aa aingle, expended rounda or different camouflage materiala.
- Do not diaplay awarenesa of the enemy'a presence at any time.
- Be aware that 50 percent of enamy anipara are woman; many Third World countriea follow auit. Patrola and OPa muat not be mialed when aighting a woman with a mounted talaacopa on her rifle. Sha ia a deadly opponent.

5-14. CONVENTIONAL OFFENSIVE OPERATIONS

Many plannera have resiated SOF interface with conventional forces and operations. Much of thia reaiatance is due to petty rivalries within the military. However, apecial operations can significantly enhance conventional operationa when correctly applied. Special operationa forces can add depth to the conventional battlefield by extending the deep battle in the enemy'a rear area while protecting the friendly rear area. The SO sniper can add deception to the battlefield and provide economy-of-force to allow the conventional commander to focus combat power elsewhere.

Conventional miasions with SOF interface require thorough coordination and planning. In addition, anıper operations must be thought of ın unilateral terms. The effect of snipers on a scale

of ones and twos is small; when employed in coordinated actions on a broad front, their effect can be substantial. Of course, this is true with most any weapon system; a cannon is not very useful as an individual piece; however, when massed, artillery is devastating.

Offensive operations that the sniper can support are:

- Movement to contact.
- Attack of built-up or fortified areas.
- River crossings.
- Support of reconnaissance and combat patrols.
- Extended ambushes.
- Cordon operations.
- Deception operations.

Sniper Employment in Offensive Operations

Special operations support to offensive operations can be useful not only throughout the battlefield but also before, during, and after the battle. SO snipers can provide support to conventional units in the following four critical phases of offensive operations:

- Preoffensive missions. Missions prior to offensive operations will primarily be in the deep battle area to gather information on the enemy's disposition. Snipers can help collect this information and interdict selected targets, if necessary. If the objective is to divert enemy assets from the main effort, then snipers can imitate the actions that the Russian partisans conducted against the Germans in World War II. The result of such actions can impair logistical operations and demoralize enemy soldiers in their own rear areas. The preoffensive missions are generally HUMINT oriented. However, several direct-action functions can be performed as a natural consequence of the snipers' proximity to the enemy as a HUMINT asset.

  * Reconnoitering. Snipers are employed to:
    - Gather (real-time) information on enemy dispositions, terrain, and weather.
    - Penetrate enemy security zones in an effort to determine the extent and nature of enemy deception efforts.
    - Confirm or deny existing intelligence as requested by the commander or S2.
    - Locate securable routes/axes of advance

o Locste enemy reserve forces snd the possible routes they could use to reisforce the objective.

o Establish or modify preplsnned fires of indirect wespons.

o Locste enemy security messures, i.e., mines, obstscles, bsrriers, etc.

* Hereesment. As s preoffensive fusction, hsrassment serves to lower the enemy's morsle snd inhibit his freedom of movement within his ows lines. It takes the feeling of a secure sres sway from the esemy snd inhibits his sbility to rest his troope. This form of hsrssement is generelly performed st ranges greeter thsn 500 metere.

* Infiltretion. Prior to sn sttsck, enipere infiltrete the gepe betwsen snemy units snd poeitione snd eeteblieh themselvee in the enemy's resr eree. During the ettack the infiltreted enipere will engege epecific tergete end targets of opportunity both on the mein line of reeietence end in ths reer eree. This eervee to divert the enemy'e ettention from the ettecking unite end to dierupt his freedom of movement in hie own reer erees. Specific tergete engeged by infiltrsting enipere include:

o Ensmy enipere.

o Command, control, end communicetione fecilitiee end pereonnel.

o Crew-eerved weepone crews.

o Artillery end forwerd sir controllere.

o Dismounted reeerve forces.
o Militery policemen.

o Wire repair snd resupply psrties.

o <u>Missions during the offense</u>. Sniping during the offeneive is dirsct-sction orisnted. Snipers sre sttsched to friendly units to provide immediste direct eupport by mesns of precision rifle fire. The mais function of sttsched snipers will be ths suppression of enemy crew-served weeposs, enemy snipers, snd commsnd snd control personnel. Snipers csn slso support the offensive by interdictisg follow-on or reserve forces (such ss second-echelon combst forcee or logistics). Conventionsl snipers, sssignsd to their perent units, css also be used to interdict key targets in the msin battle sree. Also, sttsched snipers csn be used to scresn the flenks of sdvsscisg usits, cover desd spsce from

supporting crew-served weapons, and engage specific selected targets of the defending enemy units.

o Postoffensive missions. Snipers' postoffensive role begins during the consolidation of the objective. Snipers are deployed forward of the consolidating unit's OP/LP line to interdict the advance of dismounted counterattacking forces or button up advancing armor. This will give the antitank weapons a better chance of success and survival. When sufficient numbers of snipers are available, hasty sniper ambushes are established to interdict patrols and probing elements and enemy sniper teams that normally precede a countersttack. These ambushes can also be used to harass the displaced enemy to prevent him from establishing a base to counterattack.

* Interdiction. In the interdiction mission, snipers push out beyond the range of friendly support in an effort to prein-filtrate reestablished first echelon defenses, infiltrate second echelon defenses, or engage countersttacking forces from the rear.

* Security. Because of their ability to remain undetected in close proximity to the enemy, snipers are employed to maintain contact with displaced enemy forces. During consolidation snipers range ahead of the main OP/LP line, determine the enemy's whereabouts, and continue to harass until the attack is resumed. Forward deployment also permits snipers to provide early warning of impending countersttacks.

* Counterspiping. Displaced enemy forces will often result in individuals or small groups getting cut off from their parent units. Often snipers will be left behind to disrupt the attacker's consolidation efforts. As these threats are small, snipers should be employed to track down and eliminate stay-behinds and isolated pockets of resistance. At the very least snipers will be capable of suppressing them until suitable forces can be spared to deal with them.

o Reserve missions. In a reserve role, snipers can give support where needed. They can reinforce success, or they can be used to react to enemy incursions or to provide stop-gap measures until the commander can rally more appropriate forces. Snipers can also be used to maintain security in their own rear areas, using stealth and unconventional skills to seek out enemy special forces.

* Reinforcement involves attaching themselves directly to the unit engaged and adding their fires to those of the unit.

* Intervention is a means of outflanking local resistance and suppressing it with precision rifle fire.

Sniper Support to Dismounted Movement to Contact

Snipers may be uaed in a diamounted movement to contact by deploying prior to the movement. Once deployed, they will move along the route to reconnoiter the route and select aniper hide positions to secure the route for the moving element Depending on the number of anipera available, it ia poaaible to aecure a corridor over 1,500 meters wide st the wideat, depending on the terrain, and as deep ss permitted by the number of sniper teama snd terrain.

Snipsr Support to Rsconnsisssnce Pstrols

During recoocaisseoce end combat patrols, snipere may be uaed as part of the sacurity or support elements.

5-15. CONVENTIONAL DEFENSIVE OPERATIONS

Speciel operstions aniper support to conventional defeneive operetione is similsr to offensive operstions. Tha eniper can lend support enywhere on tha battlefield including daap, rear, and main bettle araas. However, conventionel enipere normally operete in the mein bettle area in concert with their perent units--meking SO eniper support eeldom neceeeary in thie eree. The SO eniper'e moet important role ie in the deep bettle eree. The reer bsttle eree ie eleo en eree of employment, providing e reer eree threst exiete.

Sniper operetione in the deep battle eree cen be used to keep enemy efforte off-belence end directed toward reer-eree protection. The more enemy eeeete the eniper elimineteo from the deep bettle eree, the fewer forcee the enemy will heve to exscute ettecke egeinet our meio effort. Ths enipsr cen eleo provide informetion on enemy etrengthe, location of reeervee end intentione. Juet ee io offeneive operetione, SOF unite ueing enipere ehould be deployed on e broed front to dierupt the enemy'e order of bettle. Key to thie ie the dieruption of follow-on forcee in the dsep bettle eree. Snipere can eeeiet in interdicting the enemy'e soft underbelly--hie unermored logistice columne, fregile C2 nodes, end criticel militery wespons euch ee mieeilee snd fire control equipment.

Threet doctrine cells for simultsneous ettecke at criticel nodee located in US rear srese. The eniper is ideelly euited to locste end interdict the threst of enemy specisl operationa unita which conduct euch operstions.

Defensive operstions that could involve the sniper are:

- Aree defenae.
- Perimeter defense.
- Security forces.

- o Reverse slope defense.
- o Defense of built-up or fortified positions
- o River line defense.
- o Mobile defense.
- o Economy of force.
- o Withdrawal operations.

Sniping Employment in Defensive Operations

- o Harassment.

Snipers are best employed in defensive operations beyond the forward line of troops (FLOT) to provide early warning of the approaching enemy, disorganize his attack, and cause him to deploy early and, in the event of armored vehicles, cause the vehicle commanders to button up early. Snipers should be integrated in the security force while performing this mission.

Snipers may be employed directly into the FLOT defensive positions or assume their positions after withdrawal of the security fire. Snipers in the defense of the FLOT should be employed similarly to the crew-served weapons. Optimum results from the snipers will be obtained by maximizing their standoff range to the targets, positioning on lucrative avenues of approach, and engaging targets of opportunity. Sniper positions should not be emplaced near obvious indirect fire targets. No matter how well concealed a hide is, if it is in the burating radius of an indirect fire weapon, it can be compromised and destroyed.

The use of skilled marksmen will enhance the overall combat effectiveness of the defensive positions. Skilled marksmen are not necessarily snipers. They are simply skilled rifle shots who, for whatever reason, have neither the inclination nor the background skill to be successful snipers. However, they do possess the ability to engage targets at long ranges. When equipped with special weapons, such as .50 caliber or high-powered target rifles, they are particularly useful for conducting long-range harassment.

- o Delay.

When it is necessary for friendly forces to withdraw from contact with the enemy, snipers are employed to delay and impede the enemy's advance. Snipers are deployed throughout the withdrawing unit's sector. By using a series of interlocking delay positions, a handful of snipers can interdict dismounted avenues of approach and severely impede advancing enemy forces. By using

successive delay positions, snipers permit withdrawing forces to reassemble and establish new defensive positions. Sniper elements must remain mobile to avoid decisive engagement with the attacking enemy. Snipers can be employed during the withdrawal to cover obstacles with precision rifle fire and thus increase the effectiveness of the obstacles. Snipers can also be employed in the stay-behind role and attack the enemy forces' rear area and supply columns.

o Rear area protection.

In this mission snipers are used to enhance the protective measures surrounding sensitive facilities or installations. This is accomplished either through the establishment of observation posts along routes of access, as a reaction force to rear area penetrations, or by means of patrolling. Snipers will not normally patrol by themselves, but as members of established security patrols.

The role of sniping in security operations is that of extending the depth and scope of the security effort. Specific roles include:

o Protecting critical installations, sites, or projects from infiltration.

o Dominating the gaps between units to prevent infiltration by enemy combat elements or patrols.

o Preventing the removal or breaching of obstacles.

o Tracking enemy patrols known to have penetrated into the rear area.

Sniper Support to Defensive HUMINT Collection

The employment of snipers in defensive operations permits a variety of means to maintain a constant offensive pressure on the enemy. Sniping in the defense is dependent on the collection and use of information. When the snipers collect information for their personal use, this is known as targeting. Information collected for organizational use is but an element of the total HUMINT collection effort of the snipers' unit. Observation posts (OPs) are the snipers' primary means of collecting information in the defense. In the role of the observers, the snipers establish a series of OPs that dominate their sector. These OPs are of two types: overt and covert.

o Overt OPs. An overt sniping OP is not overt in the sense that its location or function is known to the enemy, but in that the snipers may engage high-priority targets from the OP itself. While firing from the OP may not necessarily reveal its

exact location, it will certainly reveal the sniper's presence and the fact that such a location exists.

o Covert OPs. OPs that offer a particularly commanding view of enemy positions that should remain unknown to the enemy and should never be fired from, regardless of the temptation to do so. The information that is collected from a well-sited covert OP is far more valuable than any targets that may appear.

5-16. CIVIL DISTURBANCE ASSISTANCE

Military assistance to civil authorities in civil disturbances is provided by the US Army when such assistance is requested or directed in accordance with prevailing laws. When such assistance is requested, the mission of military forces is to assist local authorities in the restoration and maintenance of law and order.

Military assistance is considered as a last resort. When committed, involvement is to the degree justified by the circumstances to restore law and order with a minimum loss of life and property. When using force, the guiding principle should be minimum force consistent with mission accomplishment.

The sniper team's precision fire and observation abilities give authorities a way to detect and eliminate criminal threats with low risk to innocent personnel. The use of sniper teams in civil disorders must be planned and controlled. The use may be an important factor in the control and elimination of weapons fire directed against riot control authorities.

Characteristics of Urban Violence

o Crowd behavior during a civil disturbance is essentially emotional and without reason. This, and the momentum generated, has the tendency to reduce the behavior of the total group to that of its worst members. Skillful agitators or subversive elements exploit these psychological factors during these disorders. Regardless of the reason for violence, whether the result of spontaneous reactions or deliberate incitement, the results may consist of indiscriminate looting and burning, or open and violent attacks on officials, buildings, and innocent passers-by. Rioters may set fire to buildings and vehicles to block the advance of troops, to create confusion and diversion, or to achieve goals of property destruction, looting, and sniping.

o Organized rioters or agitators may use sniper fire to cause government forces to overreact.

Considerations for Sniper Employment during Civil Disturbances

o Briefings. Sniper teams must be thoroughly briefed on the areas and routes within the riot area. Representatives of

local authorities should be assigned to the sniper teams for protection and communications with local indigenous personnel.

o Adequate Personnel. Sufficient sniper teams should be allocated to provide maximum versatility to the riot control authorities.

o Observation Areas and Field of Fire. Observation areas and fields of fire are clearly defined by streets and highways. However, surveillance and detection are complicated by the numerous rooftops, windows, and doorways from which hostile fire may be directed. Sniper teams take maximum advantage of dominant buildings or rooftops to maintain continuous observation of a riot scene. Mutually supporting teams cover blind spots or dead space within the area.

o Cover and Concealment. Built-up areas offer excellent cover and concealment for both the rioters and the sniper teams.

o Avenues of Approach. The best avenues of approach to a riot scene, or to points of observation and firing positions, are through building interiors. Movement through streets may be difficult and easily detected by rioters.

o Operations. Sniper teams should operate in each established area. The teams remain at a sufficient distance from control troops to keep from getting involved in direct riot actions.

o Firing Positions. The firing position should provide the maximum stability, because precision fire is employed to wound and not to kill. A stray shot that wounds or kills a woman, child, or unarmed rioter may only inflame an already riotous situation. When firing from a window, the sniper team should, if possible, fire from a supported position in the back of the room. This will muffle the muzzle blast, and the muzzle flash will not be noticed. If the sniper shows his rifle or part of his body, this may invite fire from weapons-equipped rioting personnel. When possible, a silencer should be used on the sniper rifle.

o Camouflage. Sniper teams should be dressed in drab or blending clothing to prevent identification or observation.

o Civil Authorities. Since civil authorities are in charge, snipers maintain a direct line of communication with the civilian who permits or directs snipers to engage. Civil authorities also determine the caliber of weapon as well as the type of ammunition. Usually, however, anything within 300 meters is engaged with 5.56mm ammunition unless special penetration capability is required.

o Sniper Team Control. A key to effective aniper team utilization is control. When directed to engage in countersniping activities, the aniper team's ections muet be ewift end preciae.

o Rules of Engegement. When directed to countersnipe, the sniper team should direct its precieion fire to wound rather than to kill, if possible.

Sniper Employment in Civil Dieturbancee

Snipers employed to counteract eniper fire from s street disorder require quick and decieive sction. When directed to support the control forces during a etreet disorder, the sniper team reacts as follows:

o Deploys to rooftops or ventege points providing observation and fielde of fire into the riot srea.

o Institutes communicstions with the commander.

o Begins observstion immsdiately snd continues it.

o Relsys information continuously to the commsndsr.

o Conducts countersniping sctions ss directsd.

During civil disorders, riotsrs msy seizs control of buildings for the purposs of utilizing the vsntage points of rooftops or windows from which to direct hostile sniper fire on riot control forces. Ths snipsr tesm may be csllsd upon to provide covsring firs to sllow the sesrch/cleering tesm to spproach snd clesr ths building. Or, the sniper msy be directed to use precision firs to wound the hostile snipsr if the hostile sniping is directed st control suthorities in mob control sctions.

Hostile snipsrs msy fire sgsinst unsrmad firefighting psrsonnel. Upon the identificstion or locstion of a riotous sniper who is dirscting fire at firefighting personnel, the sniper immediately resets to reduce the hostile sniper fira. This countersniper fire ie directed with accurecy to kill.

Looting must be controlled quickly because it may also lead to more serious acte of murder end sreon, often against innocent nonparticipants The sniper team's employment to assist in looting control is mainly for obeervstion, communicetion, and to act ss a covering force should the lootere fire upon the control forces. In instances where control forces ere fired upon, the sniper team immediately engagee the riotous sniper(s) to facilitate apprehension by the control forces.

The sniper team's role in eupport of riot control forces is equally important during the houre of darkness.

- Optical equipment, to include night vision devices, allows the sniper team to provide prolonged night observation.

- During darkness, sniper teams are best employed to accompany patrol forces, to man observation posts and roadblocks, or to cover control troops during mob control activities.

TABLE 5-5-

DATE		Angle to North from the rising or setting sun (true bearing) LATITUDE 0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°
JANUARY	1	113	112	112	114	116	116	117	118	121	124	127	133	141
	6	112	112	113	113	114	115	116	118	120	123	127	132	140
	11	112	112	113	112	113	114	115	117	119	122	125	132	139
	16	111	111	111	111	112	113	114	116	118	120	124	129	136
	21	110	110	110	111	111	112	113	115	117	119	122	127	133
	26	109	109	109	109	110	111	112	113	115	117	120	124	130
FEBRUARY	1	107	107	108	108	108	109	110	111	113	115	117	121	126
	6	106	106	106	106	107	107	108	109	111	113	115	118	123
	11	104	104	105	105	105	106	107	108	109	110	112	116	120
	16	102	102	102	102	103	104	105	106	107	108	110	112	116
	21	101	101	101	101	101	102	102	103	104	105	107	109	113
	26	99	99	99	99	100	100	100	101	102	103	104	106	108
MARCH	1	96	98	98	98	99	99	99	100	100	101	102	104	106
	6	96	96	96	96	96	97	97	97	98	98	99	100	102
	11	94	94	94	94	94	94	95	95	95	96	96	97	98
	16	92	92	92	92	92	93	93	93	93	93	93	95	94
	21	90	90	90	90	90	90	90	90	90	90	90	90	90
	26	88	88	88	88	88	88	88	88	87	87	87	87	86
APRIL	1	86	86	86	86	85	85	85	84	84	84	82	82	81
	6	84	84	84	84	83	82	82	82	82	81	80	79	77
	11	82	82	82	82	81	81	81	80	80	79	77	76	74
	16	80	80	80	80	79	79	78	78	77	76	74	73	70
	21	78	78	78	78	78	77	76	76	76	75	73	69	66
	26	77	77	76	76	76	76	75	74	73	71	69	66	63
MAY	1	75	75	75	74	74	73	73	72	70	69	66	63	58
	6	74	74	73	73	73	72	71	70	68	67	64	61	56
	11	73	73	72	72	71	70	69	68	67	64	62	58	52
	16	71	71	71	70	70	69	68	67	65	63	60	56	49
	21	70	70	70	69	69	68	67	65	64	62	61	58	53
	26	69	69	69	68	68	67	66	64	62	60	58	54	47
JUNE	1	68	68	68	67	67	66	64	63	61	58	54	49	41
	6	67	67	67	67	66	65	64	62	60	57	53	48	40
	11	67	67	67	66	66	64	63	62	59	56	53	47	39
	16	67	67	67	66	65	64	63	61	59	58	53	47	38
	21	67	67	67	66	65	64	63	62	59	56	53	47	38
	23	67	67	67	66	65	64	63	62	58	56	53	47	38
JULY	1	67	67	67	66	65	64	63	62	59	56	53	47	38
	6	67	67	67	66	66	66	64	62	60	57	53	48	40
	11	68	68	68	67	66	65	64	63	61	58	54	48	41
	16	69	68	68	68	67	66	65	64	63	60	55	50	43
	21	69	69	69	69	69	67	66	65	63	62	60	57	51
	26	70	70	70	70	69	68	67	66	64	64	63	59	54
AUGUST	1	72	72	72	72	72	71	70	69	68	66	64	61	57
	6	73	73	73	73	73	72	71	71	69	68	65	63	60
	11	75	75	74	74	74	73	73	72	71	70	68	66	62
	16	76	76	76	76	76	75	75	74	73	72	70	68	65
	21	78	78	77	77	77	77	76	76	75	74	72	71	68
	26	80	79	79	79	79	79	78	78	77	76	75	73	71
SEPTEMBER	1	82	81	82	81	81	81	80	80	79	78	77	75	73
	6	83	83	82	82	82	82	82	81	81	81	80	78	77
	11	85	85	85	85	85	85	84	84	84	83	83	82	81
	16	87	87	87	87	87	87	87	86	86	86	85	85	84
	21	89	89	89	89	89	89	89	89	89	89	88	88	88
	26	91	91	91	91	91	91	91	91	91	91	92	93	92
OCTOBER	1	93	93	93	93	93	93	93	94	94	94	95	95	96
	6	95	95	95	95	95	96	96	96	97	97	98	99	100
	11	97	97	97	97	97	98	98	99	99	100	101	102	104
	16	99	99	99	99	99	100	100	101	101	103	104	106	108
	21	101	101	101	101	101	102	103	103	104	105	107	109	113
	26	102	102	102	102	103	104	104	105	106	108	109	112	115
NOVEMBER	1	104	104	102	105	105	106	107	108	109	110	112	116	120
	6	106	106	106	107	107	108	109	110	111	112	115	119	122
	11	108	107	108	108	108	109	110	111	112	115	117	121	125
	16	110	109	109	109	110	111	112	113	115	117	120	124	130
	21	111	110	110	111	111	112	113	114	116	119	123	128	132
	24	112	111	111	112	112	113	114	116	118	120	124	129	135
DECEMBER	1	113	113	112	112	113	114	115	117	119	123	128	130	138
	6	115	115	113	113	114	115	116	118	120	125	126	132	140
	11	116	116	115	114	115	116	117	118	121	124	127	133	141
	16	118	118	113	114	115	116	117	118	121	124	127	132	141
	21	119	119	117	114	115	116	117	118	121	124	127	133	141
	26	120	120	118	114	115	116	117	118	121	124	127	135	141

NOTE: When rising, the angle is measured from East to North.

Chapter 6

SNIPER OPERATIONS ON URBANIZED TERRAIN

6-1. URBAN OPERATIONS

Snipers are extremely effective in urban terrain. Their long-range precision fire can engage targets at a distance; their advanced optics can discriminate individual point targets to save innocent bystanders or protect property; and their observation skills can offer superior intelligence-collection capabilities. In an urban environment the sniper is both a casualty producer and an intimidating psychological weapon.

Tactical Implications of Urban Terrain

Urban terrain consists mainly of man-made structures. Buildings are the main components of urban terrain. Buildings provide cover and concealment, limit fields of fire and observation, and impair movement. Thick-walled buildings provide excellent protection from hostile fire.

Urban streets are generally avenues of approach. However, forces moving along streets are often canalized by buildings and terrain that offer minimal off-road maneuver space. Obstacles on streets prove difficult to bypass, due to these restrictive avenues of approach.

Underground systems found in some urban areas are easily overlooked but can be important to the outcome of operations. They include subways, sewers, cellars, and utility systems.

Civilians will be present in urban operations, often in great numbers. Concern for the safety of noncombatants may restrict fire and limit maneuver options available to the commander.

Categories of Urban Terrain

Urban terrain may be categorized as large cities, towns and small cities, villages, or strip areas.

- Large cities (population greater than 100,000). In Europe, other than the Soviet Union, there are approximately 410 cities with a population in excess of 100,000. Large cities frequently form the core of a larger, densely populated urban complex consisting of the city, its suburban areas, and small towns. Such complexes have the appearance of a single large and continuous city containing millions of people and occupying vast areas of land.

- Towns and small cities (population of 3,000 to 100,000). These areas are mostly located along major lines of communications and situated in river valleys. Similar to larger

cities, these areas are continuing to expand and will eventually form new concentrstiona nr merge with existing ones.

o Villages (populatinn of less than 3,000). In most cases, villsges are agriculturally oriented and sre usually distributed among the more open cultivated areas.

o Strip sreas. Theae built-up sreas generally form connecting linka between villages snd towna. They are also found among linea of communicstiona leading to lsrger complexea.

Oaacriptiona nf Urban Terrain

Within the city, urban terrein differa baaed on size, location, snd history. Theae sreas within the city are generally cstegorized aa:

o Industrial areas and residential sprawl. Reaidential aress consist of some houses or small dwellings with yards, gsrdana, trees, snd fencee. Street patterns sre normslly rectsngulsr or curving. Induetrial sreas consist of one- to three-story buildings of low, flst-roofed fsctories or warshouses, generslly locsted on or slong major rsil and highwsy routes. In both regions, there are many open erees.

o Core periphery. The core periphery consists of nsrrow streeta (12 to 20 meters wide) with continuous fronts of brick snd hesvy-wslled concrate buildings. The height of the buildings is generslly uniform: 2 to 3 stories in small tnwns; 5 to 10 stories in lsrge citiss.

o City cores and outlying high-rise areas. Typicsl city coraa of todsy sre made of high-rise buildings, which vsry grsstly in haight and sllow for more open spsce betwsen buildings thsn thst sllowed in the old city cores. Outlying high-rise areas ars dominsted by this open-construction atyla to s grsster dsgrae thsn city cores. Generally, streets form e rectsngular pattern.

o Commercial ribbons. Theae sre rows of stores, ahops, etc., built slong either aide of majnr atreeta through the built-up areas. Generslly, theae atreeta st 25 meters wide or wider. The buildings are uniformly two to three atories tsll.

Nature of Urban Combat

Urban combat uauslly nccurs when s city ia between two natural obatacisa, and it csnnnt be bypassed; the aeizure of the city contributss to the attainment nf an overall nbjective, or politicsl or humsnitsrian concerna require the seizure nr retention of the city.

In the city, the rangea nf nbservation end fields of fire are reducsd by the atructures es wsll as the amoke and dust of combat

Targets will generally be exposed briefly at ranges of 200 meters or less.

Units fighting in urban areas often become isolated by an enemy; therefore, snipers must have the skill, initiative, and courage to operate effectively while isolated from their unit. As combat in modern nations can no longer be avoided in urban areas, snipers must be trained and psychologically prepared for the demands of urban combat.

The defender will generally have the advantage over the attacker in urban combat. The defender occupies strong positions, whereas the attacker must expose himself to advance. In addition, the greatly reduced line-of-sight ranges, built-in obstacles, and compartmented terrain require the commitment of more troops for a given frontage. Troop density may be three to five times greater for both attacker and defender in urban combat than in natural environments.

Due to the density of structures, radio communications are degraded. This, combined with limited observation, makes control of forces difficult. The well-established defender will probably employ wire communications to enhance control, thus adding to his advantage.

Soldiers may encounter a greater degree of stress during urban combat. Continual close combat, intense pressure, high casualties, the fleeting nature of targets, and fire from an unseen enemy may produce increased psychological strain and physical fatigue.

Commanders may be restricted in the weapons and tactics that they are allowed to employ to minimize collateral damage. This may be necessary to preserve a natural cultural heritage and gain the support of the population. In such cases, snipers are ideally suited to deliver discriminatory fire against selected targets.

Attacks will generally limit artillery fires to the direct fire mode. This is done to prevent reducing the city to rubble--an action that produces few casualties and tends to enhance the defender's fortifications, concealment, and restrict the attacker's avenues of approach.

Forces engaged in urban fighting use large quantities of munitions. Units committed to urban combat must also have special equipment, such as grappling hooks, ropes, snaplinks, construction materials, axes, sandbags, and ladders.

Urban combat historically has presented chances for looting. Looting can break down discipline, reduce alertness, increase vulnerability, and delay the progress of the unit. Looting also alienates the civilian population.

Evaluating Urban Terrain

When the sniper evaluates urban terrain, he should consider the following factors:

- Observation and Fields of Fire. Buildings on the edge of a city provide better fields of fire than buildings in the interior. In the city, tall buildings with numerous windows often provide the best fields of fire, especially if the buildings have spaces between them.

- Cover and Concealment. Buildings with brick walls and few, narrow windows provide the best balance between cover and concealment and fields of fire. Roofs provide little protection; snipers are better protected in the lower stories than directly under the roof. (An exception to this rule is the parking garage.) Floor layouts with many small rooms provide more protection than floor layouts with larger rooms.

- Obstacles. Doors and fire barriers are common in commercial buildings. They become obstacles if they are shut and secured. Furniture and appliances can also become obstacles in a building. Barbed wire can be used effectively inside a building because it further restricts movement.

- Key Control Points. Key control points in a building are entrances, hallways, and stairs; troops that control these areas control the building.

- Avenues of Approach. The best way to gain entry into a building is from the top. Therefore, the most important avenue of approach to look for is one that quickly leads to the top (fire escapes, drainpipes, or adjacent buildings).

- Intra-city Distribution of Building Types. The layout of a city can generally be determined by the distribution of the buildings within the city.

  * Mass construction buildings (modern apartments and hotels) are the most common structures in built-up areas (two-thirds of the total area) and are usually constructed of bricks.

  * Steel- and concrete-framed multistory buildings are found in the core area--a city's most valuable land--where, as centers of economic and political power they have potentially high military significance.

  * Open spaces (i.e., parks, athletic fields, and golf courses) account for about 15 percent of an average city's area. Most of this area is suitable for airmobile operations.

Line-of-Sight Factors

Streets serving areas compoeed mostly of one type of building normally have a common pattern. Street widths are grouped into three major classee:

o Narrow (7 to 15 metere). Found in euch places as medieval eectione of European citiee.

o Medium (15 to 25 metera). Found in newer, planned aections of most citiee.

o Wide (25 to 50 metere). Where buildings are located along broad boulevards or eet far apart on large parcels of land.

When a etreet ie narrow, obaerving or firing into windows of a building acroee the atreet can be difficult becauae an observer ia forced to look along the building rather than into the windowa. When the atreet ia wide, the obsarvar haa a bettar chance to look and fire into and out of the window openinga.

Sources of Information on Urban Terrain

Operationa in urban tarrain raquira detailed intelligenca. Snipera ahould hava the followmg matariala for planning operationa:

o Mapa and aarial photoa. Although tactical mapa do not ahow manmada objacta in anough datail for tactical oparationa in urban tarrain, they do ahow tha datails of terrain adjacent to urban araaa. Tactical mapa ahould be aupplamentad with both vartical and oblique air photoa.

o Civil govarnment and local military information. Conaiderabla currant information on practically all detaila of a city can ba obtainad from civil govarnmenta and local military forces:

* Larga-acale city maps.

* Diagrams of underground sewer, utility, transport, and miscellaneoua eyetems.

* Information on key public buildings and roeters of key peraonnel.

* Information on the eize and deneity of the popula-tion.

* Information on police and security capabilities.

* Information on civil defenee, air raid shelters, and firefighting capabilities.

* Information on utility systems, medical facilities, and mass communications facilities.

Camouflage Techniques for Urban Terrain

To survive in urban combat, the sniper must supplement cover and concealment with camouflage. To properly camouflage himself, the sniper must study the surroundings in the area. He must make the firing positions look like the surrounding terrain. For instance, if there is no damage to buildings, the sniper will not make loopholes for firing. The sniper will use only the materials needed; excess material can reveal his position. He will get the materials from a wide area. For example, if defending the city park, the sniper will use all of the park for resources; he will not denude a small area near the position for camouflage material.

Buildings provide numerous concealed positions. Thick masonry, stone, or brick walls offer excellent protection from direct fire and provide concealed routes. If the tactical situation permits, the sniper will inspect positions from the enemy's viewpoint. He will conduct routine checks to see if the camouflage remains material-looking and actually conceals the position. Shirts should not be removed, as exposed skin reflects light and could attract the enemy's attention.

When using urban camouflage techniques, the sniper must consider the following:

o Use of shadows. Buildings in urban areas throw sharp shadows. The sniper will use the shadow to aid in concealment during movement. He will avoid lighted areas around windows and loopholes. A lace curtain or a piece of cheesecloth provides additional concealment to snipers in interiors of rooms, if curtains are common in the area.

o Color and texture. The need to break up the silhouette of helmets and individual equipment exists in urban areas as elsewhere. In urban areas, however, burlap or canvas strips are a more effective camouflage garnish than foliage. Predominant colors are normally browns, tans, and sometimes grays, rather than greens, but each camouflage location should be evaluated separately.

o Dust In weapons emplacements a wet blanket, canvas, etc., should be used to keep dust from rising when the weapons are fired.

o Background. Snipers must pay attention to the background to ensure that they are not silhouetted or skylined, but rather blend into their surroundings.

o Common camouflage errors. To defeat enemy urban camouflage, the sniper should look for errors such as tracks or other evidence of activity, shine or shadows, unnatural or peculiar

colors or textures, muzzle flaah amoke or dust, unnatural aounda and amells, and, finally, movementa.

o Deception. Dummy poaitions can be uaed effectively to dietract the enemy and make him reveal hia poaition by firing

o Uae the terrain and alter camouflage habits to auit the aurroundinga.

o Do not forget deceptive camouflage of buildinga.

o Continue to improve poaitions. Reinforce fighting poaitiona with aandbaga or other ahrapnel and blast abaorbing material.

o Do not upaet the natural look of the area

o Do not maka poaitiona obviaua by clearing away too much debria for fielda of fire.

o Chooae firing porta in inconapicuoua apota whan availabla.

Infiltration and Exfiltration in Urban Terrain

Ona mathod ia infiltration into the outakirta of a town. Tha outakirta of a town may not be atrongly dafanded. Its dafandera may only have a aeriaa of antitank poaitiona, aecurity alamenta on the principal approach, or poaitiona blocking tha approachea to kay featurea in tha town. Tha atrong pointa and raaervea are deapar in tha city.

Aa part of a largar force, tha aniper movea by ataalth on aacondary atreeta, uaing covar and concealment of back alleya and buildinga, and aaaista in aalzing key terrain featurea and iaolating enamy poaitiona, thua aiding following unita' entry into the urban araa. Sniper teama may alao infiltrate into the city after the initial force haa aeized a foothold and move into their reapective aniper poaitiona.

Mortar and artillery fire may be uaed to attract the enemy'a attention and cover the aound of infiltratlng troopa. Infiltration ahould be done when viaibllity ia poor; chancea of aucceaa are greater if there are no civiliana ln the area.

Sniper teama may alao infiltrate into a city aa part of a larger force during an airborne or airmobile operation.

During exfiltration, extreme care must be taken to avoid detection. As in infiltration, etealth end uae of all available cover and concealment muat be uaed when leaving the aniper position. Exfiltration ahould be performed during darkness to avoid detection.

Movement Techniques in Urban Terrain

Movement in urban areas is one of the first fundamental skills that a sniper must master. Movement techniques must be practiced until they become second nature. To minimize exposure to enemy fire, the urban sniper must move so that he:

- Does not silhouette himself, but keeps low at all times.
- Avoids open areas (streets, alleys, parks).
- Selects the next covered position before moving.
- Conceals movement by using buildings, rubble, foliage, smoke, or limited visibility.
- Advances rapidly from one position to another, but not so rapidly that he creates dust clouds or noise that will help the enemy to locate him.
- Does not mask his covering fire.
- Remains alert, ready for the unexpected.

Specific movement techniques used frequently in urban operations must be learned by all snipers. They are:

- Crossing a wall. After the sniper has reconnoitered the other side, he quickly rolls over the wall, keeping a low silhouette. The speed of this and the low silhouette will deny the enemy a good target.
- Moving around a corner. Corners are dangerous. The area around the corner must be observed before the sniper moves beyond the corner. The most common mistake that a sniper makes at a corner is allowing his weapon to extend beyond the corner, exposing his position ("flagging"). Also, a sniper should not show his head at the height an enemy soldier would expect to see it. When using the correct technique for looking around a corner, the sniper lies flat on the ground and does not extend his weapon beyond the corner of the building. He exposes his head or a hand-held mirror (at ground level) only enough to permit observation around the corner.
- Moving past windows. When using the correct technique for passing a window, the sniper stays below the window level, taking care not to silhouette himself in the window. He hugs the side of the building. An enemy gunner inside the building would have to expose himself to fire from another position if he wished to engage the sniper.
- Moving past basement windows. When using the correct procedure of negotiating a basement window, the sniper stays close to the wall of the building and steps or jumps over the window without exposing his legs.

o Using doorways. Doorways should not be used as entrances or exits. If a sniper must use a doorway as an exit, he should move quickly through it to his next covered position, staying as low as possible to avoid silhouetting himself.

o Moving parallel to a building. At times, it may not be possible to use interiors of buildings for a route of advance. To correctly move along the outside of a building, the sniper hugs the side of the building, stays in the shadows, presents a low silhouette, and moves rapidly to his next position.

o Crossing open areas. Open areas such as streets, alleys, and parks should be avoided whenever possible. However, they can be crossed safely if certain fundamentals are applied by the sniper. In using the correct method for crossing an open area, the sniper may employ a distraction or limited visibility to conceal his movement. He crosses the open area at the shortest distance between two points.

* Before moving from one position to another, a sniper should make a visual reconnaissance and select the position that will give him the best cover and concealment. At the same time, he should select the route that he will take to that position. He must take care to use existing cover and concealment.

* The sniper team should not move together when crossing from one building to another or across an open area.

Building Entry Techniques

When entering a building, a sniper may be required to enter by means other than through doorways, or reach top levels of buildings by means other than stairs.

Various means, such as ladders, drainpipes, vines, helicopters, or the roofs and windows of adjoining buildings, may be used to reach the top floor or roof of a building. A sniper team may use the following aids and methods to accomplish this:

o The two-man lift, supported and unsupported; the two-man lift with heels raised; the one-man lift; the two-man pull; and individual climbing techniques. These techniques are more commonly used to gain entry into areas at lower levels.

o Ladders or grappling hooks with knotted ropes. By attaching a grappling hook to the end of a scaling rope, a sniper can scale a wall, swing from one building to another, or gain entry to an upstairs window.

o Rappelling. Rappelling is a combat technique that snipers can use to descend from the roof of a tall building to other levels or a window.

6-2. SNIPER EMPLOYMENT IN URBAN OPERATIONS

Employment Considerations

A sniper should be given general areas (buildings or a group of buildings) in which to position himself, but he selects the best positions for engagements. Sniper positions should cover obstacles, roofs, gaps in the final protective fires, and dead space. The sniper also selects numerous secondary and supplementary positions to cover his areas of responsibility. The sniper should think 3-dimensionally.

Engagement priorities for snipers are determined by the relative importance of the targets to the effective operations of the enemy. The following are normally sniper targets:

- Tank commanders.
- Direct fire support weapons crewmen.
- Crew-served weapons crewmen.
- Key leaders.
- Forward observers.
- Radiotelephone operators.
- Protected equipment.

The characteristics of built-up areas and the nature of urban warfare impact on both the effectiveness of the sniper weapons system and how the system may be employed. The sniper must consider the following basic factors during urban operations:

- Relative location of the firer and the target. Both the target and the firer may be inside or outside of buildings, or either one may be inside a building while the other is outside.

- Structural configuration of buildings. The basic classes of structures encountered in a built-up area can generally be classified as concrete, masonry, or wooden. However, any one building may include a combination of these materials. All buildings offer concealment, even though the degree of protection varies with the material used.

- Firing ranges and angles. Engagement ranges may vary from distances of less than 100 meters up to the maximum effective range of a sniper system. Depression and elevation limits may create deadspace. Target engagement from oblique angles, either vertical or horizontal, demands increased marksmanship skills. Urban areas often limit snipers to firing down or across streets, but open spaces of urban areas permit engagements at long ranges

o Visibility limitations. Added to the weather conditions that limit visibility are the urban factors of target masking and increased deadspace caused by buildings and rubble. Observation through smoke, dust, and concealment offered by shaded areas, rubble, and manmade structures influence visibility.

Sniper Employment During an Attack on or Defense of Urban Terrain

Snipers employed during the attack of a built-up area are usually divided into three phases:

o Phase I is designed to isolate the battle area by seizing terrain features that dominate the approaches to it. Snipers deliver long-range precision fire at targets of opportunity.

o Phase II consists of the advance to the built-up area and seizure of a foothold on its edge. It is during this period that snipers displace forward and assume their initial position from which to support continuation of the attack.

o Phase III consists of the advance through the built-up area in accordance with the plan of attack. Sniper teams should operate in each zone of action, moving with and supporting the infantry units. They should operate at a sufficient distance from the riflemen to keep from getting involved in firefights, but close enough to kill more distance targets that threaten the advance. Some sniper teams can operate independently of the infantry on missions of search for targets of opportunity, particularly the search for enemy snipers.

Snipers employed in a defensive posture in an urban area should be positioned in buildings that offer the best long-range fields of fire and all-round observation. They are assigned various missions such as counter-sniper fire, firing at targets of opportunity, denying the enemy access to certain areas or avenues of approach, providing fire support over barricades and obstacles, surveillance of the flank and rear areas, supporting counterattacks, and prevention of enemy observation.

Sniper Employment in Internal Security Operations

Snipers are employed in internal security operations during urban guerrilla warfare and hostage situations.

Urban guerrilla warfare. The role of the sniper in an urban guerrilla environment is to dominate the area of operations by delivery of selective, aimed fire against specific targets as authorized by local commanders. Usually this authorization only comes when such targets are about to employ firearms or other lethal weapons against the peacekeeping force or innocent civilians. The sniper's other role, almost equally as important as his primary role, is the gathering and reporting of intelligence.

Within the above roles, some specific tasks that may be assigned include:

- When authorized by local commanders, engaging dissidents/urban guerrillas who are involved in hijacking, kidnapping, holding hostages, etc.

- Engaging urban guerrilla snipers as opportunity targets or as part of a deliberate clearance operation.

- Covertly occupying concealed positions to observe selected areas.

- Recording and reporting all suspicious activities in the area of observations.

- Assisting in coordinating the activities of other elements by taking advantage of hidden observation posts.

- Providing protection for other elements of the peacekeeping force, including firemen, repair crews, etc.

Limitations. In urban guerrilla operations, there are several limiting factors that snipers would not encounter in a conventional warfare:

- There is no forward edge of the battle area (FEBA) and therefore no "no man's land" in which to operate. Snipers can therefore expect to operate in entirely hostile surroundings in most circumstances.

- The enemy is covert, perfectly camouflaged among, and totally indistinguishable from, the everyday populace that surrounds him.

- In areas where confrontation between peacekeeping forces and the urban guerrillas takes place, the guerrilla dominates the ground entirely from the point of view of continued presence and observation. Every yard of ground is known to him; it is ground of his own choosing. Anything approximating a conventional stalk to and occupation of a hide is doomed to failure.

- Although the sniper is not subject to the same difficult conditions as he is in conventional war, he is subject to other pressures. These include not only legal and political restraints but also requirements to kill or wound without the motivational stimulus normally associated with the battlefield.

- Normally in conventional war the sniper needs no clearance to fire his shot. In urban guerrilla warfare the sniper must make every effort possible to determine in each case the need

to open fire, and that it constitutes reasonable/minimum force under the circumstances.

Hostage situations. Snipers and commanding officers must appreciate that even a well-placed shot may not always result in the instantaneous incapacitation of a terrorist. Even the best sniper when armed with the best weapon and bullet combination cannot guarantee the desired results. Even an instantly fatal shot may not prevent the death of a hostage when muscle spasms in the terrorist's body trigger his weapon. As a rule then, the sniper should be employed only when all other means of solving this situation have been exhausted.

o Accuracy requirements. Consider the size of the target in a hostage situation. The only place on a man where if struck with a bullet instantaneous death will occur is the head. (Generally, the normal human being will live 8-10 seconds after being shot directly in the heart.) The entire head of a man is a relatively large target, measuring approximately 7 inches in width and 10 inches in height. But in order to narrow the odds and be more positive of an instant killing shot, the size of the target greatly reduces. The portion of the brain that controls all motor reflex actions is located directly behind the eyes and runs generally from ear lobe to ear lobe and is roughly 2 inches wide. In reality then, the size of the sniper's target is 2 inches, not 7 inches.

By applying the windage and elevation rule, it is easy to see then that the average sniper cannot and should not attempt to deliver an instantly-killing head shot beyond 200 meters. To ask him to do so requires him to do something that the rifle and ammunition combination available to him cannot do.

o Position selection. Generally, the selection of a firing position for a hostage situation is not much different from selecting a firing position for any other form of combat. The same guidelines and rules apply. Remember, the terrain and situation will dictate the choice of firing positions.

Although the sniper should be used only as a last resort, he should be moved into his position as early as possible. This will enable him to precisely estimate his ranges, positively identify both the hostages and the terrorists, and select alternate firing positions for use if the situation should change.

o Command and control. Once the decision has been made by the commander to employ the sniper, all command and control of his actions should pass to the sniper team leader. At no time should the sniper receive the command to fire from someone not in command. He should be given clearance to fire, and then he and the sniper team leader alone would decide exactly when.

If more than one anıper team is used to engage one or more targets, ıt is imperative that the asme rules of engagement apply to all teams. But it wıll be neceaasry for snipers to communicate wıth esch other. The most reliable method is to estabiiah a "lsnd line" or TA-312 phone loop much like a gun loop uaed ın artıllery battery firing poaitions. Thıs enables all teams to communıcste with all the othera without confusıon about frequenciss, rsdio procedurea, etc.

Sniper Ambuah in Urban Terrain

In caaea whara ıntelligencs is forthcoming that a target wıll be in a apecıfic place st s spscific time, s sniper ambuah ıs frequently a better alternative than s more cumberaome cordon operstion.

Cloae reconnaıaaance ia eaaier than in normal operations, as it can bs csrried out by the anıpsr sa psrt of a normsl pstrol without raıaing any undus auapicion. The prıncipal difficulty is getting ths smbush psrty to its hide undetectsd. To plscs snipsrs in positions thst ers undetected will rsquire some form of decsption plsn. This often takes the form of s routins ssarch operstion in st lesst plstoon strength. During ths courss of ths ssarch, the snipers position thsmselves in their hids. Thsy rsmsin in position when the rsmainder of the force withdrawe. This tsctic is sspecielly effective whsn csrried out st night.

Once in position ths snipsrs must be prspsrsd to remsin for lengthy periods in the cloeest proximity to ths snsmy snd thsir sympsthizere. Thsir sscurity is tsnuous st bsst. Most urbsn obsservetion posts (OPs) have "desd spots", snd this, combinsd with ths fect thst spscisl smbush positions srs frsqusntly out of dirsct observstion by othsr friendly forcss, mskss thsm highly suscsptibls to sttsck, sspscially from guerrillss armed with sxplosivss. Tha uncertainty sbout being obsarved on sntry is s constsnt worry to the snipere. It csn snd does have s most diaquisting effsct on ths sniper snd underlinsa the nsed for highly trained men of stsble chsrscter.

If the ambush position cannot be directly supported from s permanent poaition, a "backup" force muat bs plsced on immediate notice to extract ths snipers sfter the smbush or in the event of compromiae. Normally, it must be sssumed thst during the smbush the snipera cannot msks thsir sxit without assistance. They will be surroundsd by lsrgs, extremely hoatile crowds. Consequently, "backup" forcss muat not only be cloae at hand but slao sufficient in aize to handle the extraction of the anipers.

6-3. URBAN HIDES

A sniper team's success or fellure in an urban area will greatly depend on each sniper's sbility to plsce accurete fire on the enemy with the leest possible exposure to enemy fire. Consequently, the snlper must constsntly seek firing positions, snd he must use them properly when he finds them. Positions in urban terrain ere quite different thsn positions in the field. The sniper team normally has severs1 places to choose from. These can rsnge from inside attics to street-level positions in basements. This type of terrein is idesl for s sniper, snd e sniper teem cen stop sn enemy's advence through its eree of responsibility. However, one important fsct for the team to remember is that in this type of terrain the enemy will use every ssset he has to detect snd eliminete them. There sre two types of firing positions: hasty and prepared.

Hesty Hide

A hasty hide is normally occupied in the ettsck or ths esrly steges of the defense. It is e position from which s snipsr csn plsce fire upon the enemy while using eveileble cover to gsin some degrss of protection from snemy fire. Soms of the more common hssty firing positions in e built-up eree end techniques for occupying them sre:

o Firing from corners of buildings. Ths corner of s building provides cover for e hesty firing position if it is used properly. A sniper must be cspeble of firing his wespon from eithsr shoulder to minimize body exposure to the enemy. A common mistske when firing sround corners is firing from the stending position. The sniper exposes himself et the height ths snemy would expect s tsrget to sppesr end risks exposing the entire length of his body ss s tsrget for the enemy.

o Firing from behind walls. When firing from behind s wsll, the sniper must fire sround cover when poscible, not over it.

o Firing from windows. In s built-up ares windowe provide reedily sccessible firing ports. However, the sniper must not allow his weapon to protrude beyond the window; it is an obvious sign of the firer's position, especislly et night when the muzzle flesh csn essily be obeerved. A sniper should position himself as fer into the room ss possible to prevent the muzzle flssh from being seen. He should fire from s supported position (table snd ssndbsg) low enough to svoid silhouetting himself. He should use room shadow during darkness snd lesve blinds or shades drswn to a maximum to evoid being observed.

o Firing from an unprepared loophole. The sniper may fire through a hole torn in the wsll, thus svoiding the windows. He should stay as fer from the loophole es possible so that the muzzle does not protrude beyond the wall, thus conceeling the muzzle flssh.

o Firing from the peak of a roof. The peak of a roof provides a vantage point for snipers that increases their field of vision and the ranges at which they can engage targets. A chimney, a smokestack, or any other object protruding from the roof of a building can reduce the size of the target exposed and should be used.

o Firing when no cover is available. When no cover is available, target exposure can be reduced by firing from the prone position; firing from shadows, presenting no silhouette against buildings, skyline, etc.; and using tall grass, weeds, or shrubbery for concealment if available.

Prepared Hide

A prepared hide is one built or improved to allow the sniper to engage a particular area, avenue of approach, or enemy position while reducing his exposure to return fire. Common sense and imagination are the sniper team's only limitation in the construction of urban hides. There are several principles which must be followed in urban and field environments. In urban environments the sniper must still avoid silhouetting, take into account reflections and light refraction, and take particular care to minimize muzzle blast effects on dust, curtains, and other surroundings. The team constructs and occupies one of the following positions or a variation thereof:

o Chimney hide. A chimney, or any other structure protruding through the roof of a building, provides a base from which a sniper position can be built (Figure 6-3-1). Part of the roofing material is removed to allow the sniper to fire around the chimney while standing inside the building, on beams or a platform, with only his head and shoulders above the roof (behind the chimney). Sandbags are used on the sides of the position to protect the sniper's flanks.

o Roof hide. When preparing a sniper position on a roof that has no protruding structure to provide protection, the position should be prepared underneath on the enemy side of the roof (Figure 6-3-2). A small piece of roofing material should be removed to allow the sniper to engage targets in his sector. The position is reinforced with sandbags and prepared so that the only sign that a position exists is the missing piece of roofing material. Other pieces of roofing should be removed to deceive the enemy as to the true sniper position. The sniper should not be visible from outside the building. Care must be taken to hide the muzzle flash from outside the building.

o Room hide. In a room hide, the sniper team uses an existing room and fires through a window or loophole (Figure 6-3-3). Weapon support may be achieved through the use of existing furniture--that is, desks or tables. When selecting a position, teams must notice both front and back window positions. To avoid

silhouetting, they may need to use s backdrop, such as a dark-colored blanket, canvas, carpet, aad a acreen. Screens (common screening material) are important since they sllow the sniper teams maximum observation and deny observatioa by the enemy. They must not remove curtains; however, they can opea windows or remove aingle panes of glass. Remember, teams can randomly remove panes in other windowa so the position is not obvious. (For discussion on how glass affects ballistics, see Chapter 3).

o Crawl space hide. The aaiper tesm builds this position into the apace between floora in multiatory buildings (Figure 6-3-4). Loopholes sre difficult to coaatruct, but a damaged building helps considersbly. Eacape routes caa be holes knocked into the floor or ceiling. Carpet or furniture plsced over escape holes or replaced ceiling tiies will concesl them until needed

o Rafter hide position. Ths sniper team constructs this position in the sttic of an A-frame-type buiding. Thaae buildings normally hsve shingled roofs (Figure 6-3-5). Firing from insids the attic sround a chimney or other structurs hsips prevsnt snsmy observation snd firs.

Principles for Selecting and Occupying Sniper Firing Positions

o Mske msximum use of svsilsble covsr snd concsalment.

o Csrefully selsct a new firing position bsfore lesving sn old one.

o Avoid sstting s pattern. The sniper should firs from both bsrricsdsd snd unbsrricsded windows.

o The sniper position must never be subjectad to trsffic of other psrsonnei, rsgsrdless of how well ths sniper is hidden. Trsffic wiil invite observstion, snd ths aniper msy be dstectsd by opticai devicss. The sniper should ba awsre of becklighting thst might siihouette him to the enemy.

o Absndon a position from which two or three misses have been fired; detection ia almost certain.

o Operste from seperate positiona. In built-up areas, it is desirable that aniper team membera operste from separate positions. Detection of two mea ia close proximity is very probable, conaidering the number of positions from which the enemy may be observing. The anipers ahould position themselves where they can provide mutual support.

o Select alternate positiona ss well as supplementary positions to engage targets in any direction.

o Always plan the eacape route ahead of time

o Minimize the combustibility of selected positions (fireproofing).

o A secure and quiet approach route. This should, if possible, be free of garbage cans, crumbling walls, barking dogs, and other impediments.

o A secure entry and exit point. The more obvious and easily accessible entry/exit points are not necessarily the best, as their constant use during subsequent relief of sniper teams may more readily lead to compromise.

o Good arcs of observation. Restricted arcs are inevitable, but the greater the arc, the better.

o Security.

o Comfort. This is the lowest priority, but still important. Uncomfortable observing and firing positions can be maintained only for short periods. If there is no adequate relief from observation, hides can rarely remain effective for more than a few hours.

Characteristics of Urban Hides

o The overriding requirement of a hide is that it must dominate its area of responsibility.

o When selecting a suitable location, there is always a tendency to go for height. In an urban operation this can be a mistake. The greater the height attained, the more the sniper has to look out over an area and away from his immediate surroundings. For example, if a hide were established on the tenth floor of an apartment building, in order to see a road beneath, the sniper would have to lean out of the window, which does little for security.

o The locations of incidents that the sniper might have to deal with are largely unpredictable, but the ranges are usually relatively short. Consequently, a hide must cover its immediate surroundings as well as middle and far distances. In residential areas this is rarely possible, as hides are forced off ground floor levels by passing pedestrians. But, generally, it is not advisable to go above the second floor because to go higher greatly increases the deadspace in front of the hide. This is not a cardinal rule, however. Local conditions, such as being on a bus route, may force the sniper to go higher to avoid direct observation by passengers.

o In view of this weakness in local defense of urban hides, the principle of mutual support between hides assumes even greater importance. This need for mutual support is one reason why coordination and planning must take place at battalion level.

When Constructing an Urban Position, the Sniper Team Must:

o Always be aware of the outside appearance of the structure. Shooting through loopholes in barricaded windows is preferred; but, the team must make sure all other windows are also barricaded. Building loopholes in other windows also provides more than one position to fire from. When building loopholes, the team should make them different shapes (not perfect squares or circles). Dummy loopholes also confuse the enemy. Positions in attics are also effective. The team removes the shingles and cuts out loopholes in the roof; however, they must make sure there are other shingles missing from the roof so that the firing position loophole is not obvious.

o Not locate the position against contrasting background or in prominent buildings that automatically draw attention. The team must stay in the shadows while moving, observing, and engaging targets.

o Never fire close to a loophole. The team must always back away from the hole as far as possible to hide the muzzle flash and to muffle the sound of the weapon when it fires. Some positions can be located in a different room than the one the loophole is in by making a hole through a wall to connect the two and firing from inside the far room. Thus, the sniper is forming a "double baffle" with his loopholes by constructing two loopholes in succession. This will further reduce his muzzle flash and blast, and improve his concealment from enemy observation. The team must not fire continually from one position. (This is why more than one position should be constructed if time and the situation permit.) When constructing other positions, the team makes sure the target area can be observed. Sniper team positions should never be used by any personnel other than a sniper team.

Possible Hide/OP locations

o Old derelict buildings. Special attention should be paid to the possibility of encountering booby traps. One proven method of detecting guerrills booby traps is to notice if the locals (especially children) move in and about the building freely.

o Occupied houses. After careful observation of the inhabitants' daily routine, snipers can move into occupied homes and establish hides/OPs in basements and attics. This method was used very successfully by the British in Northern Ireland

o Shops.

o Schools and churches. When using these buildings as hide/OP locations, the snipers risk possible damage to what might already be strained public relations.

- Factories, sheds, and garages.

- Basements and between floors in buildings. It is possible for the sniper team to locate itself in these positions, although there may be no window or readily usable firing port available. These locations require that the sniper remove bricks or stones without leaving any noticeable evidence outside the building. To do this, the sniper must carefully measure the width of the mortar around a selected brick/stone. He must then construct a frame exactly the size of the selected brick with the frame edges exactly the size of the surrounding mortar. He then carefully removes the brick from the wall and places it in his frame. Next, he crushes the mortar and glues it to the frame so that it blends perfectly with the untouched mortar still in place. He then places the brick/frame combination back into the wall. From the outside nothing appears abnormal, while inside the sniper team has created an extremely difficult-to-detect firing port. Care must be taken, however, when firing from his position that dust does not get blown about by the muzzle blast and that the brick/frame combination is immediately replaced. Another difficulty encountered with this position is that it offers a very restricted field of view.

- Rural areas from which urban areas can be observed.

Manning the Sniping Hides/OP

Before moving into the hide/OP, the snipers must have the following information:

- The exact nature of the mission (observe, shoot, etc.).
- The length of stay.
- The local situation.
- Procedure and timing for entry.
- Emergency evacuation procedures.
- Radio procedures.
- Movement of any friendly troops.
- Procedure and timing for exit.
- Any special equipment needed.

The well-tried and understood principle of remaining back from windows and other apertures when in buildings has a marked effect on the manning of hides/OPs. The field of view from the back of a room through a window is limited. To enable a worthwhile area to

be covered, two, or even three, men may have to observe at one time from different parts of the room.

Sniper Techniques in Urban Hides

o The second floor of a building is usually the best location for the position. It presents minimal dead space but provides the team more protection since passersbys cannot easily spot it.

o Normally, a window is the best viewing aperture/loophole.

* If the window is dirty, do not clean it for better viewing.

* If curtains are prevalent in the area, do not remove those in the position. Lace or net-type curtains can be seen through from the inside, but they are difficult to see through from the outside.

* If strong winds blow the curtains open, staple, tack, or weigh them down.

* Firing a round through a curtain has little effect on accuracy; however, ensure the muzzle is far enough away to avoid muzzle blast.

* When area routine indicates open curtains, follow suit. Set up well away from the viewing aperture; however, ensure effective coverage of the assigned target area.

o Firing through glass should be avoided since more than one shot may be required. The team considers the following options:

* Break or open several windows throughout the position before occupation. This can be done during the reconnaissance phase of the operation; however, avoid drawing attention to the area.

* Remove or replace panes of glass with plastic sheeting.

o Other loopholes/viewing apertures are nearly unlimited.

* Battle damage.

* Drilled holes (hand drill).

* Brick removal.

* Loose boards/derelict houses.

o Positions can also be set up in attics or between the ceiling and roof (See rafter hide positions).

* Gable ends close to the eaves (shadow adding to concealment).

* Battle damage to gables and/or roof.

* Loose or removed tiles, shingles, or slates.

* Skylights.

o The sniper makes sure the bullet clears the loophole. The muzzle must be far enough from the loophole and the rifle boresighted to ensure the bullet's path is not in line with the bottom of the loophole.

o Front drops, usually netting, may have to be changed (if the situation permits) from dark to light colors at BMNT/EENT due to sunlight or lack of sunlight into the position.

o If the site is not multi-roomed, partitions can be made by hanging blankets or nets to separate the operating area from the rest/administrative area.

o If sandbags are required, they can be filled and carried, inside of rucksacks or can be filled in the basement, depending on the situation/location of the position site.

o Always plan an escape route that leads to the objective rally point. When forced to vacate the position, the team meets the reaction force at the ORP. Normally, the team will not be able to leave from the same point at which it gained access; therefore, a separate escape point may be required in emergency situations. The team must consider windows (other than the viewing apertures); anchored ropes to climb down building or a small, preset explosive charge situation on a wall or floor for access into adjoining rooms, buildings, or the outside.

o The type of uniform or camouflage to be worn by the team will be dictated by the situation, how the team is employed, and area of operation. The following applies:

* Most often, the normal BDU uniform and required equipment are worn.

* Urban-camouflaged uniforms can be made or purchased. Urban areas vary greatly in color (mostly gray <cinder block>; red <brick>; white <marble>; black <granite>; or stucco, clay, or wood). Regardless of area color, uniforms should include angular-line patterns.

* When necessary, most woodland-patterned BDUs can be worn outside as they are a grey or green-gray color underneath.

* Soft-soled shoes or boots are the preferred footwear in the urban environment.

* Civilian clothing can be worn (native/host country populace).

* Tradesmen's or construction workers' uniforms and accessories can be used.

NOTE: It is advisable to include a heavy-duty stapler gun and wasp spray.

6-4. WEAPONS CHARACTERISTICS IN URBAN TERRAIN

The characteristics of built-up areas and the natures of urban warfare impact on both the effectiveness of sniper systems and how they may be employed. The following basic factors must be considered by the sniper during urban operations:

o Structural Configuration of Buildings. The basic classes of structures encountered in a built-up area can generally be classified as concrete, masonry, or wooden. However, any one building may include a combination of these materials. All buildings offer concealment, even though the degree of protection varies with the materials used. The 7.62x51mm NATO ball cartridge will penetrate at 200 meters:

* Fifty inches of pinewood boards.

* Ten inches of loose sand.

* Three inches of concrete.

o Glass Penetration. If the situation should require firing through glass, the sniper should know two things:

* When the M118 ammunition penetrates glass, in most cases, the copper jacket is stripped off its lead core and the core fragments. These fragments will injure or kill should they hit either the hostage or the terrorist. The fragments show no standard pattern, but randomly fly in a cone-shaped pattern, much like shot from a shotgun. Even when the glass is angled to as much as 45 degrees, the lead core will not show any signs of deflection up to 6 feet past the point of impact with the glass.

* When the bullet impacts with the glass, the glass will shatter and explode back into the room. The angle of the bullet impact with the glass has absolutely no bearing on the

direction of the shattered glass. The shattered glass will always fly perpendicular to the pane of the glass.

6-5. ENGAGEMENT TECHNIQUES

Simultaneous Shooting

Shooting simultaneously with another sniper is a very important skill to develop, and requires much practice Procedure as follows:

- Team leader requests, "Sniper status."
- Snipers respond by numbers, "One on," "Two on," "Three off." "Four on."
- Team leader will respond with "Fire," or "Hold."
- If it is the Green Light, "Fire," all snipers will shoot simultaneously (within 1/4 second).
- Or the team leader may indicate, "One and four Fire."
- All commands should be repeated twice, "Command Fire, Fire."
- After shooting the sniper will acknowledge, "Shot out."
- This is an exercise best practiced on balloons for a visual indication of simultaneous impact.

Green Light Command

Also known as the "Fire Command", this command will generally be given by the senior man in the command post (CP). He may make the decision but then leave the command to the assault element team leader, so that it may be better coordinated with the rescue effort. The actual command must be given twice, "Command Fire, Fire!", to avoid any misunderstanding. The controller may just be saying, "Wait for me to say "Fire," but when the sniper hears, "...fire" he may shoot.

During a Continuous Green Light the sniper will radio "Shot out" after firing each time.

Count-Down System

This is a verbal count-down by the CP or team leader.
For simultaneous fire:

5
4
3
2
1-all snipers fire immediately

Sniper-initiated assault:

5
4
3-sniper fire
2-blast from stun grenades or breaching charge
1-assault team moves in

Night Shot:

5
4
3
2-lights on target
1-snipers fire
Snipers #1 & #2 immediately relocate after muzzle flash.

Window Shot:

5
4
3
2-first sniper fires and breaks glass
1-second sniper engages target
If glass must be shattered to provide a clear shot for the primary sniper to engage his priority target, it is best if the support sniper also aims his "window breaking" bullet at the target. This way, <u>two</u> projectiles have been aimed at the target, increasing the likelihood of a hit.

<u>Stockholm Syndrome</u>

This is a problem that can affect a sniper required to watch a suspect for long periods through a high magnification telescope. Limit the amount of information the sniper is given about the suspect during the briefing period. Personal information that has no impact on the tactical situation of the operation should be minimized. The syndrome can manifest itself by the sniper developing sympathies and feelings toward the suspect, caused by long periods of very close observation. A sniper must almost psych himself in the opposite direction to combat this.

6-6. URBAN TRICKS OF THE TRADE

o Urban camouflage: A bulky, light-weight hooded smock works best in the urban areas. Select colors for the smock that will blend with the colors and types of building materials in the area

o Avoid movement during daylight, but if necesaary, keep movements slow and deliberate.

- During movements through or occupation of building rooms, be alert to the principles of camouflage and concealment. Do not allow "Being Inside" lull you into a reduced awareness of the surroundings.

- Stay in shadows, match clothing to blend with the room/area; hang black sheets to eliminate backlighting against openings or light sources.

- Don't be the only open window in an air-conditioned building. Use existing curtains and leave windows intact. To make a "shooting hole", remove one pane or small corner of the glass.

- Move into the area with help from the host nation.

- Blend into the activities of the area, i.e., maintenance crew, etc., civilian clothing and civilian luggage (guitar cases will always look out of place).

- You will have the ability to carry in more equipment.

- You will be working in sniper teams and with multiple sniper teams to cover the entire area.

- Choose a position (if possible) that is naturally in a shadow; if not possible, make your own shadows by building a "cave" with dark cloth.

- Wear dark clothing to match the background

- Stay back from the window.

- Don't flag your weapon in your loophole.

- If time allows, make crawl holes from room to room.

- Avoid background light, such as doors opening behind you.

- Be careful of neutral personnel; handle with care.

- Firing positions (roof tops):

  * Stay below peak line as much as possible.

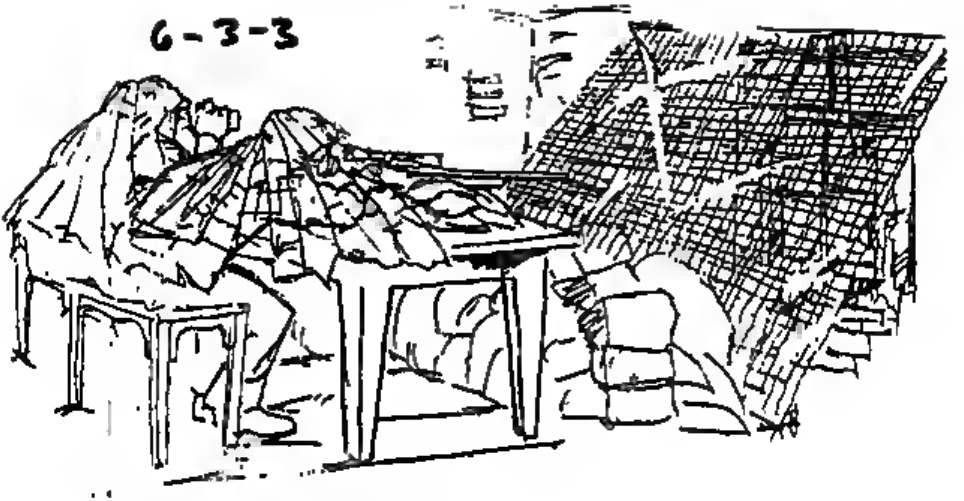
  * Don't overhang barrel.

  * If you are going to be in position a long time, put up some type of shade.

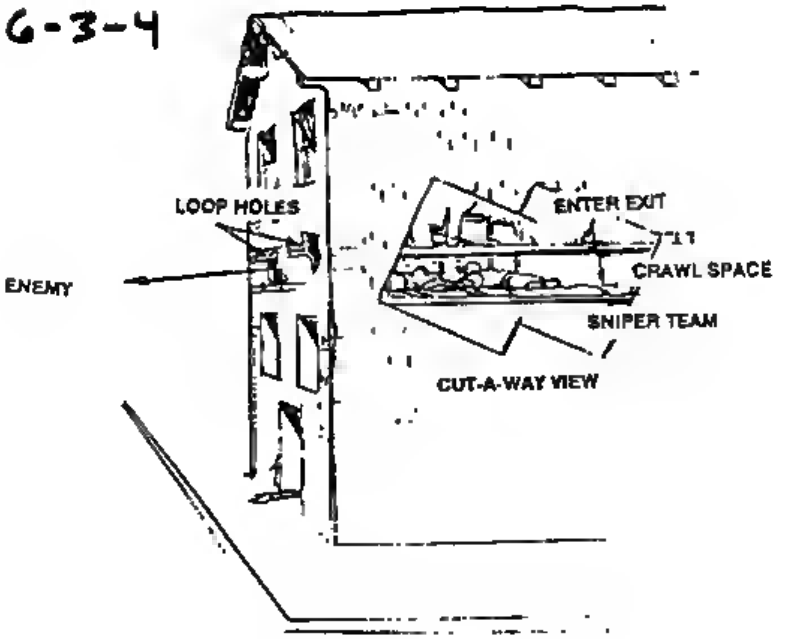
  * Try to find a position that has a background of some type.

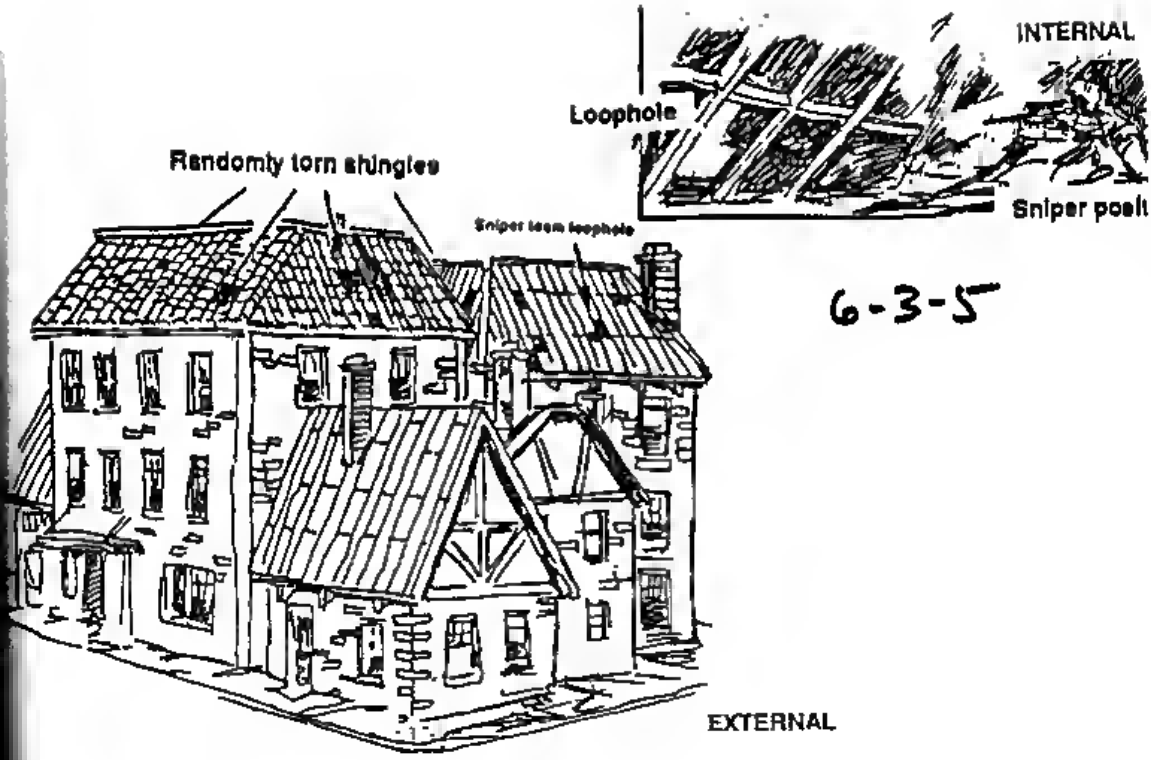
- Equipment for urban operations
  - Camera.
  - Commo equipment (snipers and command).
  - Food and water.
  - Spotting scope with stand.
  - Binoculars.
  - Dark cloth.
  - Roofing hammer with nails.
  - Tape.
  - Glass cutter.
  - Complete cleaning kit.
  - Multi-purpose knife.
  - Silenced pistol.
  - Notebook, pencils, and tape recorder.
  - Sleeping/shooting pad.

6-3-3



6-3-4


LOOP HOLES
ENTER EXIT
ENEMY
CRAWL SPACE
SNIPER TEAM
CUT-A-WAY VIEW


INTERNAL
Loophole
Sniper posit
Randomly torn shingles
Sniper team loophole
EXTERNAL

6-3-5

Chapter 7

SELECTING AND TAILORING AMMUNITION

7-1. GENERAL

WARNING: The Special Operations Target Interdiction Course, of the United States Army John F. Kennedy Special Warfare Center and School, Fort Bragg, N.C. cannot and does not accept any liability, either expressed or implied, for results of damage or injury arising from or alleged to have arisen from the use of data contained in this manual.

Because of the nature of special operations sniping, the SO sniper may not always have a steady supply of ammunition. If this is the case, the sniper himself will have to reload the best bullet/powder combination available from battlefield recovery. At other times, certain situations may arise in which issued ammunition will not do the job, for example, against hard/material targets. Therefore, the SO sniper must have an in-depth knowledge of what actually makes one round of ammunition more accurate than another. To acquire this knowledge, the sniper must learn how to reload ammunition. The guiding principle of marksmanship that also applies to reloading is: **ACCURACY IS THE PRODUCT OF UNIFORMITY!**

7-2. COMPONENTS OF THE RIFLE CARTRIDGE

The rifle cartridge has four basic components: cartridge case, bullet, powder, and primer. Three of these components (bullet, powder, and primer) are consumed during firing. The case remains after firing is completed. This case is the base component used in all reloading.

Cartridge Case. The cartridge case normally is made of brass, a malleable metal alloy. The case can be resized and reloaded repeatedly, up to 15 to 20 times, with proper care, cleaning, and trimming.

Primers. Primers are of two types: berdan and boxer (Figure 7-2-1). All USA-made cases are boxer primed. The boxer-primed case has one flash hole in the center of the case base. This case can be deprimed with a small pin punch. However, the sniper should be able to identify both types of primers. The berdan-primed case (European) has two or three small flash holes off center in the base of the case. This case can only be deprimed by using hydraulic pressure or by prying the primer out of the case.

Powder. Powder is made in three common forms: ball, extruded (tubular), and flake. Powder is made by two different processes:

single base and double base. For this reason powder can never be identified by its appearance alone.

Bullet. The bullet is the most important part of the rifle cartridge. There are many designs available for reloading, but full metal-jacketed bullets are used primarily for military purposes. To obtain the best possible accuracy, the bullet design and weight must be matched to the rifle barrel diameter and rate of twist. Also, the flight characteristics of the bullet, which are controlled by the bullet's sectional density and ballistic coefficient, must be known.

Characteristics of Cartridge Components

Cartridge Case Designs (Figure 7-2-2):

- Rimmed.
- Semirimmed.
- Rimless.
- Belted.
- Bottlenecked.
- Straight walled.

Cartridge Case Materials:

- Brass.
- Aluminium.
- Steel (lacquered).
- Steel (copper washed).

Headspace: The measurement of the cartridge case that determines the safety and accuracy of ammunition (Figure 7-2-3). A cartridge's headspace is unique to its case design and caliber as follows:

- Rimmed. Headspaces on the rim thickness.

- Rimless and bottlenecked. Headspaces from the base of the case to the datum line (middle) of the shoulder.

- Rimless and straight walled. Headspaces from the base of the case to the edge of the case mouth.

- Belted. Headspaces from the base of the case to the edge of the front shoulder of the belt.

Bullet Styles and Ballistic Characteristics (Figure 7-2-4):

- Round nose. Rapid deceleration, high arc.

- Spitzer nose. More aerodynamic, flattens trajectory.

- Flat base. Less aerodynamic than the boat tail.
- Boat tail. More aerodynamic, more effective shape
- Combinations. Spitzer/boat tail, most aerodynamic shape.

Priming Systems:

- Rimfire. Non-reloadable.
- Centerfire. Boxer or berdan, reloadable.

Propellant Types and Forms:

- Types:
  - Black powder.
  - Smokeless powder.
- Forms:
  - Ball.
  - Tubular.
  - Flake.

Metric System of Cartridge Designations

- The first numerical designation is the projectile diameter in millimeters.
- The second numerical designation is the case length in millimeters.
- Rimmed cases may be further designated with an "R" suffix denoting that the casing design is rimmed.

Example: 7.62x51mm = .308 Winchester (7.62mm/.308 inch diameter bullet with a 51mm/2.00 inch case length)

7-3. RELOADING

In this manual two types or methods of reloading the rifle cartridge will be covered: the Lee Loader reloading kit and the bench-mounted compound press reloading system. The concepts, principles of operation, and general procedures are the same, but they differ in depth, and the quality of the final product.

Lee Loader

The first method of reloading is done with the Lee Loader reloading kit. This is a small, lightweight, hand-held reloading system that can easily fit into a rucksack. Yet, if used

carefully, this reloading kit will produce a satisfactory rifle cartridge. The steps are as follows:

(1) Deprime the case.

(2) Resize the case neck.

(3) Prime the case.

(4) Tap the case loose from the resizing die.

(5) Put the correct amount of powder in the case.

(6) Seat the bullet in the case to the proper depth.

(7) Check to see if the round will chamber in the rifle.

Lee Loader Reloading Instructions

The Lee Loader reloading kit instructions are reprinted here in case the instructions in the issued kit are missing or incomplete.

(1) Knock out the old primer.

(2) With a plastic mallet or piece of wood, drive the case into the tool flush with the end.

(3) Insert a primer into the locating ring. Place the tool, with shell inside, on the priming chamber. Lightly tap on the priming rod several times until the primer is home. NEVER TRY TO SEAT A PRIMER DEEPER AFTER THE POWDER HAS BEEN ADDED.

(4) Place the tool on the decapping chamber and tap the rod to free the case. LEAVE THE CASE IN THIS POSITION FOR THE NEXT THREE STEPS.

(5) Add 1 level measure of powder. BE SURE YOU HAVE THE CORRECT MEASURE AND POWDER. SEE THE CHARGE TABLE.

(6) TO AVOID CONTACT WITH THE PRIMER AND POSSIBLE EXPLOSION, CASE MUST BE FREE FROM DIE AND RESTING IN THE DECAPPING CHAMBER. Insert the bullet through the top.

(7) TO AVOID CONTACT WITH THE PRIMER AND POSSIBLE EXPLOSION, CASE MUST BE FREE FROM DIE AND RESTING IN THE DECAPPING CHAMBER. Insert the bullet seater and tap until it contacts the stop collar. The stop collar is adjustable so you can seat the bullet as required.

Bench-mounted Compound-press Reloading System

The second method of reloading is done with the bench-mounted compound-press (R.C.B.S., Lyman, or Pacific). This is the best,

most prscise, snd most efficient method to use Unfortunately, the press system is expensive, requires more space, and is hsavy becsuse of the smount of equipment required. The specific instructions in the owner's menusls should be followed in detsil. The gensrsl steps of reloading smmunition using the bench-mounted press sre ss follows:

(1) Wipe the case clesn to prevent dirt from scrstching the case snd the inside surfsce of the sizer die. Inspect the csse for crscks, splits, and other obvious flsws. If sny flsws are present, discard the csse.

(2) Lubricsts the outside of the cese lightly by rolling the csse ovsr the lubricsting psd. This permits the csse to bs insertsd into the sizer die without sticking.

(3) Lubricate the inside of the csse neck with the csse neck brush.

(4) Screw the sizer die into the press snd sdjust the press. Put the shell holder in the press.

(5) Rsise the press handle and elide the csse into ths shell holder.

(6) Gently but firmly lower the press hsndle snd run the csse sll the wsy into ths die. This operstion will resize the csse snd punch out the fired primer from the bottom of the csse.

(7) While ths csse is still insids ths die, insert s live primer, open end up, into the cup of the primer srm.

(8) Push the primer srm forwsrd into the shell holder priming srm slot snd hold it there.

(9) Gently snd slowly reise the press hsndle. As the csse is drswn out of the die, it will be lowsred onto the live primer, which will be sested into the primer pocket. Inspsct ths primer to make sure it is properly seated. Wipe the csse clesn of lubricant.

(10) Using s deburring tool, remove sny rough sdges from inside snd outside the brsss mouth. The csse is now ressdy for powdsr charging.

(11) Consult one of the many reloading msnusls to learn whst kind snd weight of powder should be used for the specific cartridge snd bullet style snd weight. Then weigh the recommended powder charge on the scsle.

(12) Aftsr you hsve sccurstely weighed the powder, pour it into the case through s powder funnel.

(13) Most reloaders use a powder measure for powder charging cases. This tool saves the time of weighing every powder charge when reloading a quantity of cases.

(14) You are now ready for the final step of reloading the cartridge: seating the bullet. Unscrew the sizer die from the press and push the press handle down as far as it will go.

(15) Screw the bullet seater die into the press unit until it touches the raised shell holder. Then unscrew the die about three-quarters of a turn and tighten the main lock ring.

(16) Unscrew the seater plug seven or eight turns.

(17) Raise the press handle and insert the case into the shell holder.

(18) Holding the bullet over the mouth of the case with one hand, lower the press handle with the other hand and run the bullet and case into the die.

(19) Screw the seater plug downward until it touches the bullet. Raise the press handle and check the bullet and case for overall length. Repeat this procedure, lowering the seat plug until the overall cartridge length is correct and the cartridge will function reliably through the magazine of the rifle. Tighten the lock rings. A few adjustments may be necessary to get the proper and final bullet seating depth.

(20) The reloaded rifle cartridge is now ready to be fired.

<u>Accuracy Reloading Techniques</u>

Accuracy reloading techniques center around the principle of making all of the rounds of ammunition as identical as humanly possible to each other. **ACCURACY IS THE PRODUCT OF UNIFORMITY!** As these techniques are equipment and time intensive, an overview only is given to provide a background and stimulate further exploration and research.

Component Selection

- All components of the same lot number (printed on the box).
- Components of "Match" grade or quality.
- Powder selection based on case-filling capacity and velocity.

Case Preparation

- Neck-sized is best if used in a bolt action rifle.

- Square off the case head.
- Trim cases to the same length.
- Deburr case mouth.
- Uniform flash hole.
- Uniform primer pocket.
- Remove crimp from primer pocket of US military brass.
- Weigh cases. Discard cases that do not fall within the average weight +/- 2.0 grains (7.62x51mm NATO).

Cartridge Assembly

- Seat primers with hand-held priming tools.
- Seat bullet with a floating-chamber type seater.

Cartridge Measurements

- Cartridge case resized 0.001 inches shorter than headspace measurement to minimize case stretching and ensuring reliability. This is for semiautomatic rifles. For bolt action rifles, neck sizing with a collet-type die is best.
- Neck run-out is 0.002 inches or less.
- Bullet run-out is 0.002 inches or less.
- Bullet seated out to within 0.005 inches of the rifling lead. This minimizes the bullet "jump." Ensure that the cartridge fits into the magazine and feeds reliably.

Ammunition Testing

- Chronograph testing can be conducted simultaneously with the grouping capability. The hand-loaded ammunition must provide the same trajectory as issue M118 for the ballistic cam to work properly. The standard deviations (SD) of the velocity averages should be 12 fps or less. If the SDs are greater than 12 fps, check the grouping capability.

Bellietic Informetion

Ammunition	Bullet	Muzzle Velocity	Remarks
M118	173 FMJBT	2610 fps	issue
Federel 308M	168 HPBT	2650 fps	accurete
Handload	168 HPBT	2625 fpe	(1)
Handload	180 HPBT	2600 fps	(2)

Remarks:

(1). Thie handload duplicatea the M118 out to 700 matara. It is only 3 inches (0.4 MOA) below the M118 at thia diatance. This ia the maximum ranga for thia bullet. Bulleta undergo increaaed turbulence when they decelerata through the aound barrier ("going eub-aonic"). Thia deatebilizing effact occura between 900-1300 fpa. Thia effect determinea the "maximum effactive range" of a bullat. Sierra ratea thair 168 HPBT MatchKing bullat effective out to 600 yarda.

(2). Thia handload duplicatea tha M118 out to 1000 metera. It ia 3.1 inchaa below tha M118 at 1000 metara (0.31 MOA). It can be conaidered a balliatic duplicate but with a higher quality bullat.

Barrel Twiat and Bullet Compatibility

For optimal accuracy, tha barrel twiat muat be compatible with the bullat aalactad. Aa a ganaral rula, aa the bullat weight increaaee, barral twiat muat "epead up." For a given bullet diamatar, aa tha waight increaaea, tha bullat becomaa longar. As the bullet increaaea in langth (and weight) it muat be apun faatar for adaquate atebilization. For axampla, conaidar the .308 Wincheater with 150 and 190 grain bulleta. The 150 grain bullet ia well etabilized in e barrel with a 1 turn in 12 inch twiat (1/12). The 190 grain bullet cen be atabilized in e 1/12 twist, but it providee better long-range eccuracy and etebility with a 1/10 twiat. To determine an approximation for the bullet's correct twiet rate, the Greenhill formula ie quite accurate:

$$\text{Berrel Twiat} = \frac{(150)(\text{Bullet Diameter})(\text{Bullet Diameter})}{\text{Bullet Length}}$$

Reloading Manuele end Reference Booke

Many manuals and booke have been publiehed on the subject of reloading ammunition. The followmng ere recommended for reading and etudying:

- Sierra Bullets Rifle Reloading Manual, 3rd Edition.

- Hornady Handbook of Cartridge Reloading
- Hand Loader's Digest.
- ABC's of Reloading.

7-4. BATTLEFIELD RECOVERY OF AMMUNITION

Any 7.62mm/.308-inch diameter bullet found throughout the world may be used to reload the 7.62x51mm NATO (.308 Wincheater) cartridge case. This reloaded cartridge, with the correct powder and primer combination, can then be fired in the 7.62x51mm NATO SWS. Although satisfactory, this ammunition would not be of high quality and should be used only in the event that M118 Special Ball ammunition is not available.

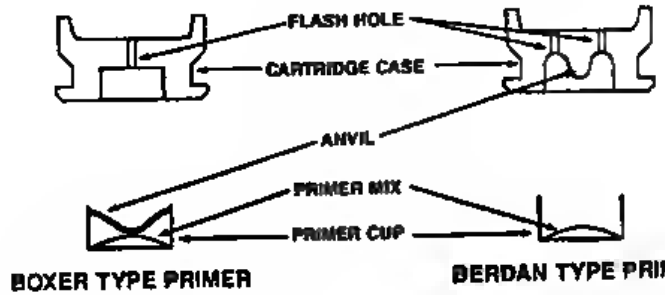
Using the above principle, a SO sniper can use an expended case from his own rifle and a captured enemy round of the appropriate caliber, broken down for its bullet and powder, to create a 7.62x51mm cartridge. With this capability, the sniper needs to carry only an 11-ounce Lee Loader and a supply of large rifle primers. (A thousand primers will fit into a box 2 inches by 2 inches by 4 1/2 inches and will weigh only 9 ounces.)

The extreme variance between different countries' specifications for ammunition makes the listing of specific load data beyond the scope of this handbook. Specific load data would, however, be suitable for inclusion in an area study.

Battlefield Recovery Guidelines:

- A lighter bullet may be substituted for a heavier bullet, but never vice versa.
- A slower burning powder may be substituted for a faster burning powder but never vice versa.
- A 7.62x54mm R 180 gn FMJBT bullet with 42 grains of powder can be loaded into a 7.62x51mm NATO cartridge case.
- A 7.62x39mm 120-123 gn FMJFB (flat base) bullet with 42 grains of powder can be loaded into a 7.62x51mm NATO cartridge case.

7-2-1



USAJFKSWCS

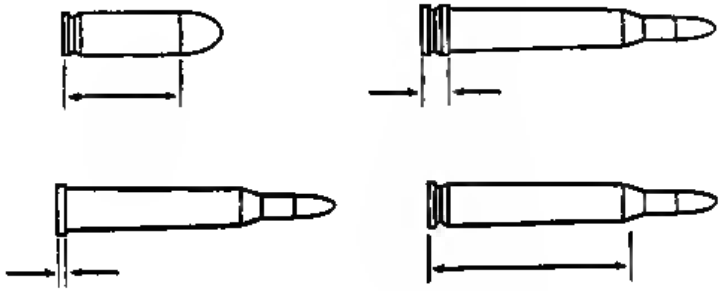
7-2-2

CASE TYPES

USAJFKSWCS

7-2-3

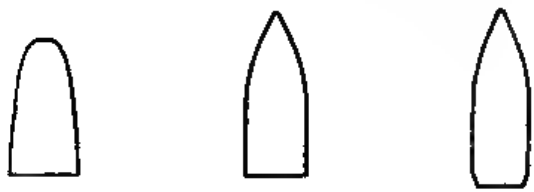
HEAD SPACE



USAJFKSWCS

7-2-4

BULLET SHAPE



USAJFKSWCS

Appendia A

TRICKS OF THE TRADE

o If several anipera are allocated to a high value target (HVT) and cannot agree on the renge (with aasociated scope sdjuatmenta), the anipera can each place the range data on his telescope eccording to his own best estimate. The snipers would then fire simultsneouely, and the percentege of obtsining s hit would be mngnifiad

o Whan oparating in e denied area, it sometimes ia sppropriata to uae an indigenous weapon and ammunition. Tha evidence left (caainga or recovered bullets) would diaguias the true identity of the anipar, and tha aponaor.

o The aniper muat be eware of the ground beneath the muzzle of his rifle. This is criticel when the ground is sandy, dusty, or loose aoil. The sniper shouid either wet the area (urinsting will save valuable drinking water) or cover with e suitsbly sized cloth. Also, in demp conditions (eerly morning) the sniper should be swsre of the possibility of the exhaust smoke indicsting the position. An srss with broken ground or foiisgs will help to concesl the smoke signsture. But, the sniper should be swsre of the muzzle blsst moving tsll gress end small plants. The sniper must choose his position csrefully.

o It is possible for thoussods of bullets to psss by or come close to the sniper without doiog eny harm.

o When in s stetic positioo, it is wise to build ths sniper hids to provide s direction of fire et sn angls to the front of the enemy. This provides cover snd conceelmeot, snd the enamy thst is hit by the sniper's fire will look to their front for his locstion.

o If the aniper suspects that bis system has iost its zero, end the aituetion sllowa aightiog shots, the sniper ahould uae "aelf-marking" targets that do not betrey bia direction of fire. The sniper may uae pools of water, cement waila, brick, etc. Hs should not use cens, boxsa, or other targets thst csn be ussd to aight back on szimuth to bis locatioo.

o The aniper should locate hia aniper bide in s location away from sny obvious tergst refereoce poiots. If it looks liks an obvioua poaition, it ia.

o Before tsking the ahot, especielly at longer rengsa where the src of the bullet will be quits high, the aniper ahould visualize the arc of the bullet. Thia eoaurea thet there will be no obstacles in the path of the bullet. The sniper should consider thia the "mssk and over-head clearence" of the aniper rifle.

o Selection of the final firing point is critical to mission success. If the target is expected to be moving, the sniper should select a position that allows a shot at the target as it moves toward or away from him. Relative to the sniper's position, the target will be a stationary one, and therefore, require a no-lead hold.

o If it is necessary to engage a unit of enemy personnel, the sniper should engage the targets that are the greatest threat to him and his team's survival. If this is not a factor, he should engage the targets farthest away from him, and not in the front of the enemy formation. If he hits the front-most targets first, the remainder of the unit will deploy and conduct fire and movement to pin the sniper down and engage him. By eliminating the rear-most targets first, the sniper buys himself more time as their numbers will be decreased, possibly without their knowledge, and ensures the sniper with the best possible (least suspecting) targets.

o The sniper and his weapon can be of great help in the counter-ambush immediate action drill. The sniper should look for target indicators (muzzle flash, disturbed vegetation, ejecting brass, etc.) and use a "searching fire" technique where he fires rounds approximately nine inches from the ground, every six inches into the suspected enemy location. The M-21/LSR is best for this because of its capacity, and rapid fire capability.

o Recommended ammunition selection for the M-21/LSR for night operations: 1 tracer per two match rounds, with the last three rounds tracer to signify the necessity for a magazine change.

o When dealing with multiple targets, such as two hostage-takers covered by the sniper and another team sniper, he will need to coordinate with his colleague so that they fire simultaneously. Taking them out one at a time may allow the second suspect time to harm the hostages. One technique, if the snipers are within earshot or in radio contact with each other on a clear frequency, is for each of them to keep saying aloud in a steady, low voice,"Wait...wait...wait..." so long as they do not have a clear shot. When they do, they should stay silent and listen for the moment they are both silent. They should allow a one-second pause, then open fire together. In some cases, two snipers are assigned to engage a single suspect, particularly if he is behind heavy glass and there is fear that shots may be deflected. One option here is for one of the snipers to aim for his head, and the other for his chest, and fire simultaneously.

o CT situation: hostage-takers have been known to switch clothes with the hostages. This requires the sniper to distinguish facial features, and places a premium on higher-powered spotting scopes and rifle telescopes.

o The position behind a loophole should be darkened with a drape so that the sniper is not silhouetted or light allowed

through the loophole. The sniper should shut his loopholes when anyone enters or exits the hide.

o The observer can tell if the target is hit. The target's response is similar to that of big-game. An animal which is fired at and missed always stands tense for the fraction of a second before it bounds away, but when an animal is struck by the bullet there is no pause. It bounds away at once on the impact, or falls. Thus, a stag shot through the heart commences his death rush at once, to fall dead within 50 yards, whereas a stag missed gives that tell-tale sudden start. If a human is hit well, he will fall forward or appear to crumple like a ragdoll. Continued activity or falling to the side indicates a superficial hit.

o Speed is important. The sniper should practice for an aimed shot in 2 seconds or less.

o The sniper should use armor-piercing (AP) rounds for anti-materiel missions to take out the weapon, not the crew. The crew is easier to replace.

Appendix B

BALLISTIC CHARTS

APPENDIX B

SIERRA BALLISTICS III
****

DATA FOR: 7.62MM M118 M24 BC'S: .515(H), .503(M), .491(L)
COMPANY: Sierra TEMP: 59 PRESSURE: 29.53 IN. HUMIDITY: 78%
ZERO: 100 meters CROSSWIND: -10.00 mph TAIL WIND: +0.00 mph
ELEVATION ANGLE: 0 degs ALTITUDE: 0 feet SIGHT HGT. 1.7 IN

RANGE METERS	VELOCITY (FPS)	ENERGY (FT-LB)	BULLET PATH(IN)	DROP (INCH)	DRIFT (INCH)	TIME OF FLIGHT(SEC)
0	2,610.0	2,616	-1.7	+0.0	+0.0	0.000000
25	2,561.9	2,521	-0.7	-0.2	-0.1	0.031719
50	2,514.3	2,428	-0.0	-0.7	-0.2	0.064037
75	2,467.2	2,338	+0.2	-1.7	-0.5	0.096969
100	2,420.6	2,250	+0.0	-3.1	-0.9	0.130533
125	2,374.4	2,165	-0.6	-4.9	-1.3	0.164745
150	2,328.8	2,083	-1.7	-7.2	-1.9	0.199625
175	2,283.7	2,003	-3.3	-9.9	-2.7	0.235191
200	2,239.1	1,925	-5.4	-13.2	-3.5	0.271464
225	2,194.9	1,850	-8.0	-17.0	-4.5	0.308463
250	2,151.2	1,777	-11.1	-21.3	-5.6	0.346210
275	2,108.0	1,707	-14.8	-26.2	-6.9	0.384726
300	2,065.3	1,638	-19.1	-31.6	-8.3	0.424036
325	2,023.2	1,572	-24.0	-37.7	-9.8	0.464162
350	1,981.5	1,508	-29.5	-44.4	-11.5	0.505128
375	1,940.4	1,446	-35.6	-51.8	-13.3	0.546959
400	1,899.8	1,386	-42.5	-59.8	-15.3	0.589681
425	1,859.7	1,328	-50.1	-68.6	-17.4	0.633319
450	1,820.3	1,273	-58.4	-78.1	-19.8	0.677901
475	1,781.2	1,219	-67.5	-88.4	-22.2	0.723454
500	1,742.0	1,165	-77.5	-99.5	-24.9	0.770022
525	1,703.4	1,114	-88.2	-111.5	-27.8	0.817641
550	1,665.5	1,065	-99.9	-124.3	-30.8	0.866341
575	1,628.4	1,018	-112.5	-138.1	-34.0	0.916152
600	1,591.9	973	-126.1	-152.9	-37.5	0.967102
625	1,556.3	930	-140.7	-168.7	-41.1	1.019220
650	1,521.4	889	-156.4	-185.6	-45.0	1.072533
675	1,487.3	850	-173.2	-203.6	-49.0	1.127070
700	1,454.1	812	-191.2	-222.8	-53.3	1.182854
725	1,421.8	776	-210.4	-243.2	-57.8	1.239911
750	1,390.4	743	-231.0	-264.9	-62.6	1.298263
775	1,360.0	710	-252.8	-287.9	-67.5	1.357928
800	1,330.6	680	-276.1	-312.4	-72.7	1.418923
825	1,302.2	651	-300.8	-338.3	-78.2	1.481260
850	1,274.9	624	-327.0	-365.7	-83.9	1.544946
875	1,248.8	599	-354.9	-394.8	-89.8	1.609982
900	1,223.9	575	-384.4	-425.5	-95.9	1.676366
925	1,200.1	553	-415.7	-458.0	-102.3	1.744087
950	1,177.6	533	-448.8	-492.2	-108.9	1.813130
975	1,156.3	514	-483.8	-528.4	-115.8	1.883472

DATE: 01-03-1993

SIERRA BALLISTICS III
****

DATA FOR: 7.62MM M118 M24 BC'S: .515(H), .503(M), .491(L)
COMPANY: Sierra TEMP: 59 PRESSURE: 29.53 IN. HUMIDITY: 78%
ZERO: 100 meters CROSSWIND: -10.00 mph TAIL WIND: +0.00 mph
ELEVATION ANGLE: 0 degs ALTITUDE: 0 feet SIGHT HGT. 1.7 IN

RANGE METERS	VELOCITY (FPS)	ENERGY (FT-LB)	BULLET PATH(IN)	DROP (INCH)	DRIFT (INCH)	TIME OF FLIGHT(SEC)
1,000	1,136.3	496	-520.7	-566.5	-122.9	1.955087

****

(CUT OUT AND SAVE FOR REFRENCE)

RANGE	PATH	DRIFT
0	-1.7	0.0
100	+0.0	-0.9
200	-5.4	-3.5
300	-19.1	-8.3
400	-42.5	-15.3
500	-77.5	-24.9

DATE: 01-03-1993

SIERRA BALLISTICS III
****

ENVIRONMENTAL CONDITIONS

Actual Barometric Pressure at firing site:	29.53 IN.
Actual Speed of Sound at firing site:	1,121 FPS
Effective ballistic coefficient at firing site:	0.514

ANIMAL LEAD CALCULATIONS

Avg. lead for a running antelope at 100 metere is:	8 feet.
Avg. lead for a running deer at 100 metere is:	3 feet.
Avg. lead for a running elk at 100 metere is:	5 feet.

Appendix C

RANGE ESTIMATION TABLES

JUDGING DISTANCE

RANGES IN METERS

MIL	19 INCHES	1 METER	1.87 METERS (5 ft. 6 in)	1.75 METERS (5 ft. 9 in)	1.8 METERS (6 ft)
1	526.6	1000	1870	1750	1800
1 1/4	421	800	2448	1400	1440
1 1/2	351	887	1113	1187	1200
1 3/4	278	571	954	1000	1028.5
2	241	500	635	875	900
2 1/4	214	444	742	778	800
2 1/2	193	400	886	700	720
2 3/4	175	364	607	636	654.5
3	161	333	557	583	600
3 1/4	148	306	514	536	554
3 1/2	138	266	477	500	514
3 3/4	129	267	445	467	480
4	121	250	417.5	437.5	450
4 1/4	114	235	393	412	423.5
4 1/2	107	222	371	388	400
4 3/4	101	210	352	388	379
5	88.5	200	334	350	360
5 1/4		190.5	316	333	343
5 1/2		181.5	304	318	327
5 3/4		173.9	290	304	313
6		166.6	276	282	300
6 1/4		160	287	280	288
6 1/2		153.8	257	288	277
6 3/4		148.1	247	258	267
7		142.8	239	250	287
8		125	209	219	225
9			188	184	200
10			187	175	180

NOTE: At rangee exceeding 421 meters, the 19-inch (shoulder width) reference ia not acreptable for use, aa a 1/4 mil error in estimation, is beyond the ballistic capsbility of the M118 cartridge. The eame sleo spplies to the 1 meter unit of messured beyond 571 metsrs. These are for short rsnge use only. REMEMBER, the point blsnk rsnge for the M118 csrtridge is 300 metsrs with a 250 meter zero.

APPENDIX C

TABLE OF MILS FOR OBJECTS

FEET		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
YARDS		1	1⅓	1⅔	2	2⅓	2⅔	3	3⅓	3⅔	4	4⅓	4⅔	5	5⅓	5⅔	6
MILS	5	600	800	850	1200	1400	1600	1800	1800	1850	2000	2150	2350	2550	2650	2850	3000
	4.5	450	600	750	900	1050	1200	1350	1500	1650	1800	1950	2100	2250	2400	2550	2700
	4	400	533	667	800	933	1067	1200	1333	1467	1600	1733	1867	2000	2133	2267	2400
	3.5	350	467	583	700	817	933	1050	1167	1283	1400	1517	1633	1750	1867	1983	2100
	3	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800
	2.5	250	333	417	500	583	667	750	833	917	1000	1083	1167	1250	1333	1417	1500
	2	200	267	333	400	467	533	600	667	733	800	867	933	1000	1067	1133	1200
	1.5	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
	1	100	133	167	200	233	267	300	333	367	400	433	467	500	533	567	600
	0.5	50	67	83	100	117	133	150	167	183	200	217	233	250	267	283	300
MILS	10	100	133	167	200	233	267	300	333	367	400	433	467	500	533	567	600
	9	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540
	8	80	107	133	160	187	213	240	267	293	320	347	373	400	427	453	480
	7	70	93	117	140	163	187	210	233	257	280	303	327	350	373	397	420
	6	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360
	5	50	67	83	100	117	133	150	167	183	200	217	233	250	267	283	300
	4	40	53	67	80	93	107	120	133	147	160	173	187	200	213	227	240
	3	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
	2	20	27	33	40	47	53	60	67	73	80	87	93	100	107	113	120
	1	10	13	17	20	23	27	30	33	37	40	43	47	50	53	57	60
MILS	0.5	5	7	8	10	12	13	15	17	18	20	22	23	25	27	28	30

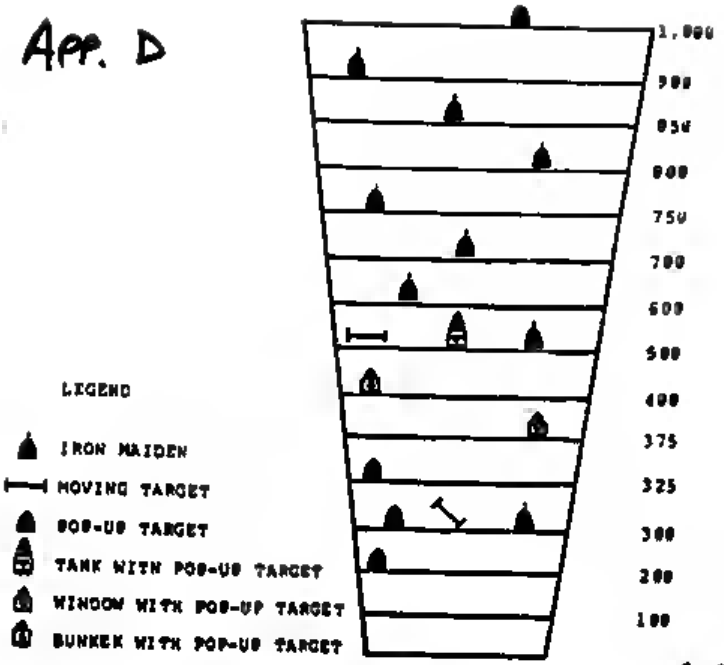
1) ESTIMATE HEIGHT OF TARGET AND LOCATE ACROSS THE TOP
2) MEASURE HEIGHT OF TARGET IN MILS AND LOCATE DOWN THE SIDE
3) MOVE DOWN FROM THE TOP AND RIGHT FROM THE SIDE TO FIND THE RANGE IN YARDS

$$\frac{\text{HEIGHT OF TARGET (YARDS)} \times 1{,}000}{\text{HEIGHT OF TARGET (MILS)}} = \text{RANGE (YARDS)}$$

Appendix D

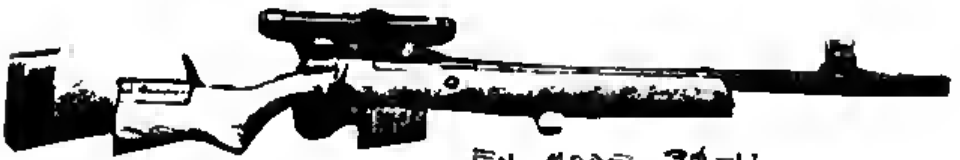
SNIPER RANGE LAYOUT

App. D



APPENDIX H

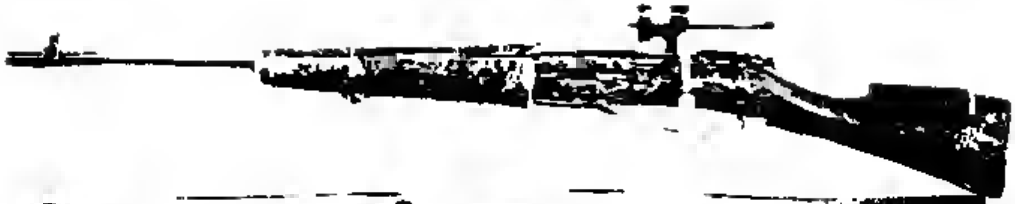
Steyr 7.62mm NATO Model SSG rifle.



FN MODEL 30-11

The Canadian 7.62 × 51mm NATO Sniper Rifle C3 with telescopic sight.

Model 54 Sniper Rifle



SUPER SILENCED SNIPER RIFLE Mk 2

French FR-F1 Sniper Rifle. Available in both 7.5 × 54mm and 7.62 × 51mm NATO

Left side view of the FRF2 shows more of the rifle's features: high cheekpiece and removable spacers on the buttstock, usable emergency open sights on barrel.

Mauser 66-SP

WA 2000

PSG-1

GALIL

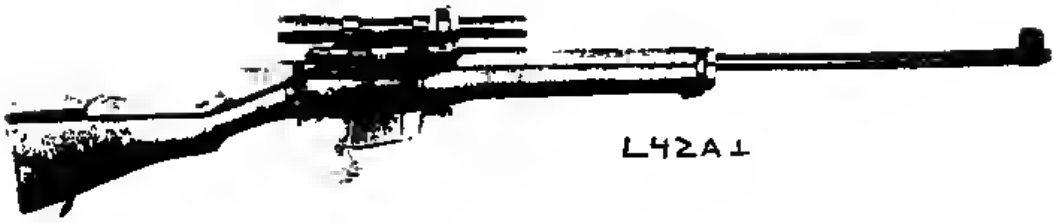
BERETTA N/A

PRC - SEE SOVIET SVD

Romanian PPK sniper rifle.

SPAIN: C-75 N/A

SWITZERLAND SIG 510-4 N/A



L42A1

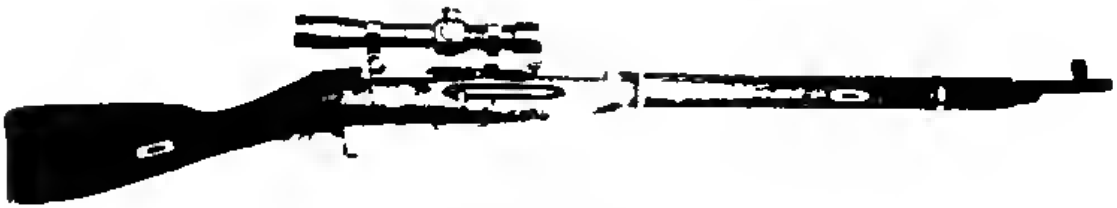
MODEL 82

MODEL 85

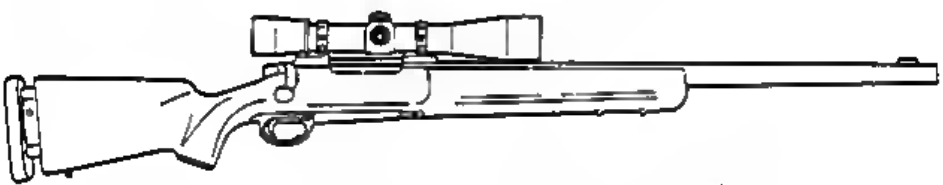
The Accuracy International Model PM was designed by Olympic gold medalist Malcolm Cooper. It is available in four versions: Long Range, Suppressed, Infantry and Counter Terrorist. The Model PM is imported by Sage International.

No. 4 MARK I(T)

Soviet Samozaridnyia Vintovka Dragunova (SVD) 7.62 × 54Rmm Sniper Rifle

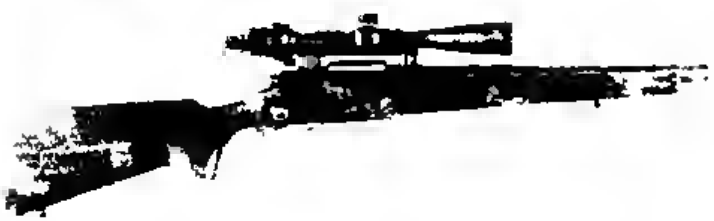


Soviet Sniper Rifles: SVT40 (top) and M1891/30 (bottom). Both are caliber 7.62 × 54Rmm



M24

M21



USMC M40A1 sniper rifle made by Remington

BARRETT .50 CAL M82A1

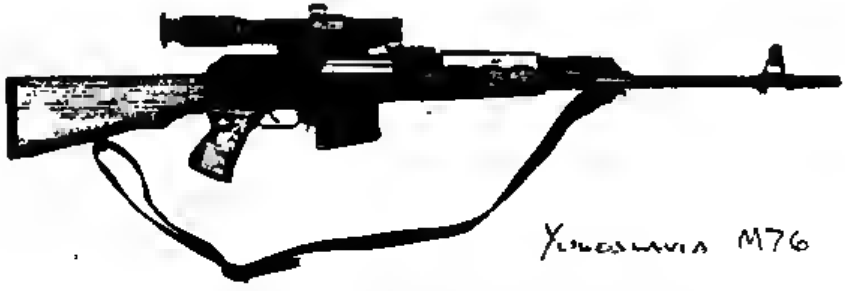
AMAC, INC
2202 Redmond Road
Jacksonville, AR 72076

CONVERTIBLE LONG RANGE RIFLE SYSTEM
7.62 ● 8.58 x 71

Caliber .30 M1903A4 Rifle.

Caliber .30 M1C Sniper Rifle.

Caliber .30 M1D Sniper Rifle.



YUGOSLAVIA M76

Appendix E

SUSTAINMENT PROGRAM

E-1. SUPPORT FOR TRAINING/SUSTAINMENT TRAINING

The purpose of proficisncy training ia to enable the aniper to msintain ths high dsgrae of akill snd proficiancy required. Special emphasia should be placed on msrkamanahip snd stalking bacause they sre the most perishsble of aniper akills.

Frequancy of Training.

The frequency of trsining is important to maintsin sniper proficiency. The eniper should be teated or avsluated on all aniper skilla st leaat snnually; aemi-annually is better. Markamanship quslificstion should occur at least gusrterly to ths atandards outlined in the SOTIC POI.

Time Devoted to Training.

Ths tima tha unit will sllow the sniper to dsvots to sustsinment training will determins ths sniper's ovarsll proficisncy. Expsriencs hse shown that to maintsin ths dsgres of femilisrity with his weapen that is nssded to sngsgs tergsts st unknown distsncee, the sniper should dsvots st lseet eight hours s week in sniper msrksmsnship trsining. This amount of time spsnt in quality merksmsnship trsining will sustsin ths snipsr's proficisncy in the ert of prscision iong-rsnge rifis firs.

Basic Ammunition Requirements.

Bsaic ammunition raquirements for sustsinment type firing can be found in Tabls 5-34, Annual Ammunition Allocstion snd Trsining Strstegy for ths M21 Sniper Rifle, DA Psm 350-38 (Standards in Weapons Training) (psgs 106). This is tha minimum smmunition raquirement, not ths maximum.

Training Exercises.

The following exercises may be incorporsted into tesm trsining to improve every tesm member'a skills snd enhance ths team's ovsrall cspsbilitiaa.

o Markamsnahip exerciaea. Markamanahip trsining tskea up s lsrge smount of the sniper'a overall proficiency trsining. The sniper must be proficient in eii sniper-relsted skills, but without markamanahip, these other akills sre useleaa. Some exemples of markamanship exerciaea sre ss follows:

* Grouping exercisea. These sre simple exercises where the sniper fires five-round shot groups at various rangea, from 100 to 900 metsrs. Analysis of the ahot groups helps the sniper to datsrmine shooting errora end environmental effecta in s more or less controlled environment. Thia alao siiows the sniper to

collect his cold bore shot and environmental data.

* Moving target firing. Firing at moving targets helps the sniper to maintain proficiency in this difficult skill. Targets should be engaged from 300 to 800 meters. These exercises are simple to run. Moving targets are provided by having personnel "walk" silhouette targets on a stick or board held over their head while protected in the pits of a traditional known distance range. The targets must be cut to 12 inches in width to maintain realism.

* Unknown distance firing. Unknown distance firing helps the sniper to remain proficient in a variety of sniper skills. The sniper pair must fill out a range card/sector sketch and estimate the range to targets. The pair must then use the information to engage targets of unknown distance.

* Firing under artificial illumination and/or NVD. This exercise includes both stationary and moving targets from 300 to 600 meters under artificial illumination or NVDs.

* Stress shooting. All previous exercises can be further enhanced with the additional application of a stress factor. Applying a time limit, stalking to the target, or physical effort prior to firing are but a few stressors that may be applied to the sniper.

* Firing air rifles. Match grade air rifles, (ex. the RWS 75 or the Daisy Gamo), can be effectively used for marksmanship training. Air rifles do not require any special ranges. Any area with a minimum of 10 meters of distance can be used, indoors or outdoors. This range, used in conjunction with .22 caliber bullet traps and standing off-hand (unsupported), can be used to reinforce marksmanship fundamentals. Ranges of up to 1,000 meters can be simulated by using scaled targets and a good air rifle scope in an outdoor area. Ranges of 10 meters to 50 meters and targets, reduced in size to represent different ranges, can be used (see Appendix E-3). Pellets may be purchased for about $4 per 500 pellets, rifles for between $150 and $300 each, and .22 caliber bullet traps for approximately $25 each. Pellet traps should not be used; they will not stand up to heavy use.

o Stalking Exercises. Stalking exercises enable the sniper to train and develop skills in movement, camouflage, map reading, mission planning, and position selection. Live fire may be incorporated to confirm the sniper's target engagement.

o Range Estimation Exercises. There are many ways to conduct this type of exercise. The sniper estimates ranges out to 1,000 meters and must be within 10 percent of the correct range. The sniper should use only his binoculars and rifle telescope as aids.

o Other Exercises. Other exercises may be developed or incorporated into the sniper's training program to enhance his

observation, memory, snd csmouflage skille.

E-2. M24 SNIPER MILES TRAINING

MILES trsioing is sn invslusble tool in realietic combat training. Other than sctusl combat, the sniper's best means of dieplaying effectiveness ss s force multiplier is through the use of the M24/21 SWS with MILES.

Characterietics of the MILES Transmitter.

The M24 SWS MILES trsnsmitter is s modifisd M16 trsnsmitter. A specisl mounting brscket sttaches the lassr trsnsmittsr to the right side of ths bsrrel (looking from the butt end) of ths M24 snd plsces it parsllel with ths line of bore. The lsser beam output has bssn amplifisd snd tightened to provide precision fire cspsbility out to 1,000 meters. (For component informstion snd instructions on mounting, zsroing, end operstion, sss TM 9-1265-211-10).

Training Value.

Using ths M24/21 with MILES, the trsinsr csn snhsncs sustsinmsnt trsining in tsrgst engsgement such ss:

o Selsction of firing positions. Dus to trsnsmitter modificstions, ths sniper must sttain s firing position thst sffords clsar fields of fire. Any obstruction (vsgstation, terrsin) csn prsvsnt s one-shot skill by dsflscting or blocking the path of the lssr bsam. By selscting this typs of position, ths sniper will greatly improve his observation and firing capabilities.

o Tsrgst detsction/selection. Using MILES sgsinst multipls/clustsr tsrgsts requires the sniper to sslsct ths tsrgst thst will have the grsatest effect on the enemy. The trsiner providss instsnt feedbsck on the sniper's performance. Situstions may be crested such ss bunkers, hostsgs situstions, sod MOUT firing. The hit-or-miss indicsting espscts of MILES srs invsluable in this type of trsining.

o Range estimstion. As indicsted in Chspter 4, the sniper must be highly skilled io rsnge estimation to properly use the M24 SWS. Ths trsioer's evslustion of this ability is ss simple se the sniper pulling the trigger. When the range to the tsrget is properly computed snd elevstion dialed on the M3A, one shot, either hit or miss, indicstss s strength or weskness in the sniper's range estimation sbility (if the fundamentals of marksmsnship were properly spplied).

o Marksmsoship. A target hit (kill) with MILES is the same as one with live ammunitioo. Proper application of marksmanehip fundsmentals results in s first-round kill; the trsining vslue is

self-evident.

MILES Training Limitations.

The concept of MILES is to provide realistic training; however, MILES is limited in its capabilities as applied to the sniper's mission of long-range precision fire. These limitations are as follows:

o Lack of external ballistics training. A laser is a concentrated beam of light emitted by the MILES transmitter. It travels from the sniper's weapon undisturbed by outside forces such as temperature, humidity, and wind. Lack of these effects may lull the sniper into a false sense of confidence. Without the sniper correcting for these factors, their importance fades to disregard. The trainers should constantly reinforce the importance of these factors. The sniper should make a mental note of changes that should be applied to compensate for these effects.

o Engagement of moving targets. The engagement of moving targets (Chapter 3) requires the sniper to establish a target lead to compensate for flight time of his bullet. Travelling in excess of 186,00 miles per second (speed of light), the MILES laser nullifies the requirement for target lead. Again, the sniper may be lulled into a false sense of confidence. The trainer should enforce the principles of moving target engagement by having the sniper note appropriate target lead for the given situation.

E-3. REDUCED SCALE RANGE

When using air rifles for marksmanship training, the sniper can use one of several formulas to simulate distances for a reduced or subcaliber range. Listed below are several formulas and explanations on how to use them. Also listed is a chart based on a 6-foot man at ranges to 1,000 yards/meters.

Reduced Scale Target Height Formula

The formula to\ find the reduced height of a target at a given range and s simulated range is as follows:

$$\frac{R\ 1 \times H\ 1}{R\ 2} = H2$$

R 1 = Reduced range+
R 2 = Simulated range+
H 1 = Height of actual target*
H 2 = Reduced height of target*

NOTES:

o +Both the reduced range and the simulated range must agree in measurement, i.e., 1,000 meters and 35 meters or 1,000 yards and 35 yards.

o *If the height of the real target ie expressed in inchea (i.e., 72 inches for a 6-foot man), the enswer e in inchea. If the height ie expreaeed in feet, the answer will be in feet.

EXAMPLES:

R 1 = 35 METERS R 2 = 500 METERS H 1 = 72 INCHES

$$\frac{35 \times 72}{500} = 5.04 \text{ INCHES}$$

R 1 = 25 YARDS R 2 = 800 YARDS R 1 = 6 FEET

$$\frac{25 \times 6}{800} = .1875 \text{ FEET}$$

To chenge the .1875 feet to inchea, multiply by 12.

$$.1875 \times 12 = 2.25 \text{ INCHES}$$

Reduced Scale Simulated Range Formula

The formula to find the aimulated range of a given reduced targat height at e given reduced range ia as followa:

$$\frac{R\ 1 \times H\ 1}{H\ 2} = R\ 2$$

EXAMPLE:

A 3-inch target et 35 metera will aimulate what range?

R 1 = 35 METERS H 1 = 72 INCHES H 2 = 3 INCHES

$$\frac{35 \times 72}{3} = 840 \text{ METERS}$$

Reduced Range Chart

Below is a table to simulate in inches a 6-foot man at various ranges on the given reduced ranges.

Range	15 yds/m	20 yds/m	25 yds/m	30 yds/m	35 yds/m
1000 yds/m	1.08"	1.44"	1.80"	2.16"	2.52"
900 yds/m	1.20"	1.60"	2.00"	2.40"	2.80"
800 yds/m	1.35"	1.80"	2.25"	2.70"	3.15"
700 yds/m	1.54"	2.05"	2.57"	3.08"	3.60"
600 yds/m	1.80"	2.40"	3.00"	3.60"	4.20"
500 yds/m	2.16"	2.88"	3.60"	4.32"	5.04"
400 yds/m	2.70"	3.60"	4.50"	5.40"	6.30"
300 yds/m	3.60"	4.80"	6.00"	7.20"	8.40"
200 yds/m	5.40"	7.20"	9.00"	10.8"	12.6"
100 yds/m	10.8"	14.4"	18.0"	21.6"	25.2"

The center of the pellet strike should be the determining factor due to the size difference of the pellet diameter versus the range and simulated target size. It is also recommended that the ranges of 100 through 400 yards/meters be against a head or head and shoulders target and not the full body.

For example, at 35 meters the normal human head is simulated to be 2.8 inches high by 1.75 inches wide for a simulated range of 100 meters.

An additional advantage to the reduced range targets is that when the sniper utilizes the above table or formulas, a reduced scale unknown distance range for judging distance will be constructed at the same time. When he uses the mil scale in the Leupold M3A Ultra 10x scope, the targets will give the same mil readings as a real target at that distance. As an example, a 6-foot man at 500 yards is 4 mils high. A 3.60-inch target at 25 yards is 4 mils high, and simulates at 6-foot man at 500 yards.

Appendix F

SNIPER TRAINING EXERCISES

F-1. Stalking Exercises

The purpose of stalking exercises is to give the sniper confidence in his ability to approach and occupy a firing position without being observed.

Description. Having studied a map (and aerial photograph, if available), individual students must stalk for a predesignated distance, which could be 1,000 yards or more, depending on the area selected. All stalking exercises and tests should be approximately 1,000 yards with a 4-hour time limit. The student must stalk to within 150 to 200 yards of two trained observers, who are scanning the area with binoculars and fire two blanks without being detected.

Reconnaissance by the Conducting Officer/NCO. The area used for a stalking exercise must be chosen with great care. An area in which a student must do the low crawl for the complete distance would be unsuitable. The following items should be considered:

- As much of the area as possible should be visible to the observer. This forces the student to use the ground properly, even when far from the observer's location.
- Where possible, available cover should decrease as the student nears the observer's position. This will enable him to take chances early in the stalk and force him to move more carefully as he closes in on his firing position.
- The students must start the stalk in an area out of sight of the observer.
- Boundaries must be established by means of natural features or the use of markers.

Conduct of the Exercise. In a location near the jumpoff point for the stalk, the student is briefed on the following:

- Aim of the exercise.
- Boundaries.
- Time limit (usually 4 hours).
- Standards to be achieved.

After the briefing, the students are dispatched at intervals

to avoid congestion.

In addition to the two obaervera, there are two "walkera", equipped with radioa, who will poaition themselves within the stalk area. If an observer aees a atudent, he will contact a walker by radio and direct him to within 5 feet of the student's locatıon. Therefore, when a atudent ia detected, the observer can immediately tell the atudent what give bim away.

Whan the atudent reachea hia firing poaition, which ia within 150 to 200 yarda of the obaarver, he will fire a blank at an obaerver. This will tell tha walker he ia ready to continue the reat of the sxercise. Tha walker will then move to within I0 yarda of the atudent. The obaerver will aearcb a 10-yard radiua around the walker for the sniper atudent. If the atudant is undatected, the walker will tell him to chamber and fire hia aecond blank. If the aniper ia atill unaaen, the walkar will then point in the etudent'e direction, and tha obaerver will aaarch in detail for enything that indicatea a human form, rifle, or equipment. If tha eniper remaine undetacted, tha walker will than move in and put hia hand on the atudent'a head. Tha obsarver will again aearch in datail. If the anipar atudant ia not sean at thia point, ha must tall ths walker whioh obsarvar ha firad at and what tha obsarvar is doing. Tha obaarvar wevaa hia het, acratchea bia faca, or makas soma gestura that the atudant cen idantify whan uaing hie telascope. Tha sniper atudant muat then tell the walkar hie exact ranga, wind valocity, and windaga eppliad to tba acope. If tha eniper complatee all of thasa stepa corractly, ha hae pasaed the etalk axarciaa.

A oritique ia conducted at tha conclusion of tha axarcise, touching on main problem araas.

Craating Intarest. To create intareet and to giva tha etudsnta practica in obsarvetion and stelking akilla. one-half of the olaae could be positioned to observe ths oonduct of tha atalk. Seaing an arror made ie an effective way of teaching better atalking skilla. When a atudant ia caught, he ahould be sent to the obaervation poat (OP) to observe the exerciae.

F-2. Rangc Estimation Exercises

Range estimation exerciaea are to make the sniper proficient in accurately judging diatance.

Deacription. The atudent ie taken to an obaervation poat, and different objects over distances of up to I,000 meters are indicated to him. After time for coneideration, he writea down the eatimated distance to each object. He may uas only his binoculars and rifle telescope ae aids, and ha muat eatimste to wtihin 10 percent of the correct range (a 6-foot man-aized target ahould be

utilized).

Reconnaissance by the Conducting officer/NCO. Each exercise must take place in a different area, offering a variety of terrain. The exercise areas should include dead space as well as places where the student will be observing uphill or downhill. Extra objects should be selected in case those originally chosen cannot be seen due to weather, or for other reasons.

Conduct of the Exercise. The students are brought to the observation post, issued a record card, and given a review on methods of judging distances and causes of miscalculation. They are then briefed on the following:

- Aim of the exercise.
- Reference points.
- Time limit per object.
- Standard to be achieved.

Students are spread out and the first object is indicated. The student is allowed 3 minutes to estimate the distance and write it down. The sequence is repeated for a total of eight objects. The cards are collected, and the correct range to each object is given. The instructor points out in each case why the distance might be underestimated or overestimated. After correction, the cards are given back to the students. In this way, the student retains a record of his performance.

Standards. The student is deemed to have failed if he estimates three or more distances incorrectly.

F-3. Observation Exercises

The purpose of observation exercises is to practice the sniper's ability to observe an enemy and accurately record the results of his observations.

Description. The student is given an arc of about 1,800 mils to observe for a period of not more than 40 minutes. He is issued a panoramic sketch of his arc and is expected to plot on the sketch any objects he sees in his area. Objects are so positioned as to be invisible to the naked eye, indistinguishable when using binoculars, but recognizable when using the spotting telescope.

Reconnaissance by the Conducting Officer/NCO. In choosing the location for the exercise, the following points should be considered:

- Number of objects in the arc.
- Time limits.
- Equipment which they are allowed to use (binoculars and spotting telescopes).
- Standard to be attained.

Each student takes up the prone position on the observation line and is issued a panoramic sketch of the area. The staff is available to answer questions about the sketch if a student is confused. (If the class is large, the observation line could be broken into a right and left half. A student could spend the first 20 minutes in one half and then move to the other. This ensures that he sees all the ground in the arc.) At the end of 40 minutes, all sheets are collected and the students are shown the location of each object. This is best done by the students staying in their positions and watching while a member of the staff points out each object. In this way, the students will see why they failed to find an object, even though it was visible. (Students should view first with binoculars and then with spotting telescopes before the instructor picks the item up.)

A critique is then held, bringing out the main points.

Scoring. Students are given half a point for each object correctly plotted and another half point for naming the object correctly.

Standards. The student is deemed to have failed if he scores less than 8 points out of a total of 12 points (12 disguised military objects.)

F-4. Hide Construction Exercise

The purpose of the hide construction exercise is to show the sniper how to build a hide and remain undetected while being observed. The purpose of a hide is to camouflage a sniper or sniper team which is not in movement.

Description. The sniper students are given 8 hours to build a temporary hide large enough to hold a sniper team with all their necessary equipment.

Reconnaissance by the Conducting Officer/NCO. The hide exercise area should be selected with great care. It can be in any type of terrain, but there should be more than enough prospective spots in which to build a hide. The area should be easily bounded by left and right, far and near limits so that when the instructor points out the limits to the students, they can be easily and quickly identified. There should be enough tools (i.e., axes, picks, shovels, and sandbags) available to accommodate the entire class. There must be sufficient rations and water available to the students to last the entire exercise, which is about 9 1/2 hours total--8 hours instruction, 1 1/2 hours testing.

Conduct of the Exercise. The students are issued a shovel, axe, pickaxe, and approximately 20 sandbags per team. The students are brought to the area and briefed on the purpose of the exercise, their time limit for construction, and their area limits. The students are then allowed to begin construction of their hides.

NOTE: During the construction, an instructor should be present at all times to act as an advisor.

At the end of 8 hours, the students' hides are all checked to ensure that they are complete. An infantry officer is brought out to act as an observer. He is placed in an area 300 yards from the hide area, where he starts his observation with binoculars and a 20X M49 spotting scope. The observer, after failing to find a hide, is brought forward 150 yards and again commences observation.

An instructor in the field (walker with radio) then moves to within 10 yards of a hide and informs the observer. The observer then tells the walker to have the sniper in the hide to load and fire his only round (blank). If the sniper's muzzle blast is seen, or if the hide is seen due to improper construction, the team fails, but they remain in the hide. These procedures are repeated for all the sniper teams. The observer is then brought down to within 25 yards of each hide to determine whether they can be seen with the naked eye at that distance. The observer is not shown the hide. He must find it. If the sniper team is located at 25 yards, it fails and is allowed to come out and see its discrepancies. If the team is not seen, it passes.

Other Requirements. The sniper teams should also be required to fill out a range card and a sniper's log book and make a field sketch. One way of helping them achieve this is to have an instructor showing "flash cards" from 150 yards away, beginning when the observer arrives and ending when the observer moves to within 25 yards. The sniper teams should record everything they see on the flash cards and anything going on at the observation post during the exercise.

Standards. The sniper teams are required to pass all phases in order to pass the exercise. All range cards, log books, and field sketches must be turned in for grading and a final determination of pass or fail.

F-5. Camouflage and Concealment Exercises

Camouflage and concealment exercises are held to help the sniper student to select final firing positions.

Description. The student conceals himself within 200 yards of an observer, who, using binoculars, tries to find the student. The student must be able to fire blank ammunition at the observer without being seen, and have the correct elevation and windage on his sight. The student must remain unseen throughout the conduct of the exercise.

Reconnaissance by the Conducting Officer/NCO. In choosing the location for the exercise, the instructor ensures that certain conditions are met. These are:

- There must be adequate space to ensure students are not crowded together in the area. There should be at least twice the number of potential positions as there are students. Once the area has been established, the limits should be marked in some manner (e.g., flags, trees, prominent features, etc.). Students should then be allowed to choose any position within the limits for their final firing position.

- The observer must be located where he can see the entire problem area.

As there will be several concealment exercises throughout the sniper course, different types of terrain should be chosen in order that the students may practice concealment in varied conditions. For instance, one exercise could take place in a fairly open area, one along a wood line, one in shrubs, and another in hilly or rough terrain.

Conduct of the Exercise. The sniper is given a specified area with boundaries in which to conceal himself properly. The observers turn their backs to the area and allow the students 5 minutes to conceal themselves. At the end of 5 minutes, the observers turn and commence observation in their search for concealed snipers. This observation should last approximately one-half hour (more time is allotted, if desired). At the conclusion of observation, the observer will instruct, by radio, one of the two observers (walkers) in the field to move to within 10 meters of one of the snipers. The sniper is given one blank. If he cannot be seen after the walker moves within the 10 meters, the walker will tell him to load and fire his blank. The observer is looking for muzzle blast, vegetation flying after the shot, and movement by the sniper before and after he fires. If the student cannot be seen, the walker then extends his arm in the direction of the sniper, indicating his position. If the sniper remains unseen after indication, the walker goes to the sniper's position and places his hand, palm facing the observer, directly on top of the

sniper's head. If the sniper passess sll of the above, he must then state his slavation, windage, and what type of movement ths obssrver is ssking.

Crssting Interest. To crests interest and to give students practice in observation, one-half of the clsss may be positioned with the observer in order that they csn profit from the mistakes of tha other half of the class. When s student fsils ths exercisa, he should go to ths observation post to obssrvs.

Appendix G

MISSION ESSENTIAL TASK LIST

1.	Move Tactically (Sniper)	7-5-1825
2.	Select/Engage Tergete (Sniper)	7-5-1869
3	Select/Occupy Firing Position (Sniper)	7-5-1871
4.	Eatimate Range (Sniper)	7-5-1872
5.	Debrief (Sniper)	7-5-1809

ELEMENT: SNIPER TEAM

TASK: MOVE Tactically (7-5-1825) (FM 7-8, TC 23-14)

ITERATION 1 2 3 4 5 (circle)

TNG STATUS T P U (circle)

CONDITION: The aniper team ia given a miaaion to move with a aecurity element. Both friendly and OPFOR unita have indirect fire and CAS availabia.

TASK STANDARD:

1. The aniper team movea undetected.
2. The aniper team movea tactically baaed on METT-T.
3. The aniper team compliea with all graphic control meaaurea.
4. The aniper taam movea along the route apacified in the order.
5. The aniper taam errivea at the deetinetion apecified in the order.
6. The eniper taam errivea at the epecified time.
7. The aniper team auataina no caeualties.

SUBTASKS AND STANDARDS: GO NO-GO

***+1. The aniper taem leeder aelacta the movement routea, that:**

a. Avoids known OPFOR positions and obstacles.

b. Offers cover and concealment.

c. Takes advantage of difficult terrain, swamp, and dense woods.

d. Avoids natural lines of drift.

e. Avoids trails, roads, footpaths, or built-up or populated areas unless required by the mission.

2. The sniper team personnel use the proper movement techniques: sniper low crawl, medium crawl, high crawl, hand-and-knee crawl, and walk.

a. The observer is the point man; the sniper follows.

b. The observer's sector is from 9 o'clock to 3 o'clock; the sniper's position is from 3 o'clock to 9 o'clock.

c. The observer and the sniper must maintain visual contact even when lying on the ground.

d. The interval between the observer and the sniper is not more then 20 meters.

e. The sniper reacts to the point man's actions.

f. The sniper and the point man cross danger areas. (See T&EO 7-3/4-1026, Cross Danger Area <ARTEP 7-8-MTP>).

3. The sniper team maintains operation security.

a Moves slowly and cautiously--not quickly or jerkily.

b. Uses camouflage.

c. Avoids making sounds.

4. The sniper team maintains proper communication procedures.

a. Maintains radio listening silence.

b. Uses visual signals

*Leader task
+Critical task

TASK PERFORMANCE SUMMARY BLOCK

ITERATION	1	2	3	4	5	TOTAL
TOTAL SUBTASKS AND STANDARDS EVALUATED						
TOTAL SUBTASKS AND STANDARDS "GO"						

OPFOR TASK and STANDARDS:

TASK: ENGAGE Sniper Team
STANDARDS:

1. The OPFOR detects the moving sniper team.

2. The OPFOR delays the team beyond its allotted time (leader evaluation).

3. The OPFOR prevents the team from moving to its assigned destination or along its prescribed route (leader evaluation).

4. The OPFOR inflicts one casualty on the sniper team.

ELEMENT: SNIPER TEAM

TASK: SELECT/ENGAGE Targets (7-5-1869) (TC 23-14)

ITERATION 1 2 3 4 5 (circle)

TNG STATUS T P U (circle)

CONDITION: The sniper team is given a specific sniper mission (target criteria and priority), either by supporting a unit or by acting independently. The sniper team observes the targets. Both friendly and OPFOR units have indirect fire and CAS available.

TASK STANDARD:

1. The sniper team selects the prinrity target and destroys it within two rounds.

2. The sniper team sustains no casualties.

SUBTASKS AND STANDARDS: GO NO-GO

1. **The snipar taam identifies the following priority targets thet will limit the OPFOR'a fighting ability:**

   a. OPFOR sniper.

   b. Officers, both military and political.

   c. NCOs.

   d. Scout or dog team.

   e. Crew-served weapon personnel.

   f. Vehicle commandars and drivers.

   g. Communications personnel.

   h. Forward nbservers.

   i. Criticel equipment such as opticel sights or redios.

*2. **Tha snipar taam leadar selects the prinrity targets to be engeged.**

   a. The sniper team members selact the tergat thet is critical to the miasion.

   b. The snipar team does nnt become a target whila searching fnr nr firing nn an OPFOR target.

   c. The sniper team satimates their range from tha target. (See T&EO 7-5-1872, Estimate Ranga). The range must be within 300 to 800 matars.

   d. The sniper team leader choose to engage targets or continuas the observation nf the targets.

3. **The sniper taam engages tha targat.**

a. The obeerver givee the wind edjuetment.

b. The eniper edjuste the ecope on the target and informs the observer when completed.

*Leeder teek

SUBTASKS AND STANDARDS: GO NO-GO

c. The obeerver reconfirms the wind adjuetment and notifiee the eniper of any chengee.

d. The eniper firee.

e. The obeerver watchee the wapor trail and the etrike of the round. He then preparee to give an edjuetment if the aniper mieaad.

f. If the aniper mieeee, he checks the ecope and firee again, or he may engege e eecond terget.

TASK PERFORMANCE SUMMARY BLOCK

ITERATION	1	2	3	4	5	TOTAL
TOTAL SUBTASKS AND STANDARDS EVALUATED						
TOTAL SUBTASKS AND STANDARDS "GO"						

OPFOR TASK and STANDARDS:

TASK: REACT to Sniper Fire

STANDARDS:

1. The OPFOR eeeumes covered end concealed poeitione within three eeconde of receiving eniper fire.

2. The OPFOR detecte the eniper team'e location within five eeconde.

3. The OPFOR returns fire within five seconds of receiving sniper fire.

4. The OPFOR inflicts one casualty on the sniper team.

5. The OPFOR sustains no more than one casualty.

ELEMENT: SNIPER TEAM

TASK: SELECT/OCCUPY Firing Position (7-5-1871) (TC 23-14)

ITERATION	1	2	3	4	5	(circle)
TNG STATUS		T	P	U		(circle)

CONDITION: The sniper team is given a mission to engage a target and an area of operations. Both friendly and OPFOR units have indirect fire and CAS available.

TASK STANDARD:

1. The sniper team selects a final sniper position within 300 to 600 meters of the target area.

2. The sniper team is not detected while occupying the position.

3. The sniper team sustains no casualties.

SUBTASKS AND STANDARDS:	GO	NO-GO

*1. The sniper team leader selects a final firing position that has:

   a. Maximum fields of fire and observation of the target area.

   b. Maximum concealment from OPFOR observation.

   c. Covered routes into and out of the position.

   d. A position no closer than 300 meters to the target area.

   e. A natural or man-made obstacle (if available) between the sniper team's position and the target.

2. The snipar taam maintaina operation sacurity by avoiding:

   a. Prominent, readily identifiable objecta and terrain featurea.

   b. Roads and traila.

   c. Objects that may make noise.

   d. Optical davices that may reflect light.

   a. Leaving a path that leads to thair positiona.

   f. Firing poaition(s).

3. The anipar taam operatea from a poaition by:

   a. Using shadows (if availebie).

   b. Using camouflage that doas not contrast with the surrounding aree.

4. The sniper teem coeupies the position.

   a. Moves into the position undetected.

   b. Scans ahead end watches for ovarhead movement.

   e. Keeps ths body outline low to the ground.

*Leadar tasks

SUBTASKS AND STANDARDS: GO NO-GO

5. The snipar team austaina tha firing position.

   a. Orgenizaa the equipment.

   b. Estabiiahes a ayatem of obsarvetion and reliaf. (Sae T&EO 7-3/4-1058, Sustain <ARTEP 7-8-MTP>).

TASK PERFORMANCE SUMMARY BLOCK

ITERATION	1	2	3	4	5	TOTAL
TOTAL SUBTASKS AND STANDARDS EVALUATED						
TOTAL SUBTASKS AND STANDARDS "GO"						

OPFOR TASKS and STANDARDS:

TASK: DETECT Snipers

STANDARDS:

1. The OPFOR detects movement of the snipers moving into the firing position.
2. The OPFOR inflicts more than one casualty.
3. The OPFOR engages the sniper team within five seconds.
4. The OPFOR sustains no more than one casualty.

ELEMENT: SNIPER TEAM

TASK: ESTIMATE Range (7-5-1872) (TC 23-14)

	ITERATION	1	2	3	4	5	(circle)
	TNG STATUS		T	P	U		(circle)

CONDITION: The sniper team has to employ range estimation throughout the target area to engage targets. Both friendly and OPFOR units have indirect fire and CAS available.

TASK STANDARD:

1. The sniper team agrees on range estimation.
2. The averaged range estimation must be within 10 percent of the actual distance.
3. The sniper team sustains no casualties.

SUBTASKS AND STANDARDS:	GO	NO-GO

1. Each member of the sniper team estimates the range to the target by selecting one or more of the following methods:

   a. The use of maps.
   b. A 100-meter increment.

   c. The appearance of objects.

   d. The mil-scale formula.

   e. The use of the sniper weapon system.

   f. The use of the range card.

   g. The bracketing method.

   h. A combination of methods.

2. The snipers estimate the range throughout the target area.

   a. Each sniper estimates the range to the target(s).

   b. The estimated range by individuals is averaged within 10 percent, plus or minus, of the true range.

*+3. The team leader determines the estimated range to be used.

   a. Each sniper estimates the range to the target(s).

   b. The team leader compares the estimates.

   c. The team leader makes the final determination of the range to the target(s).

   d. The range to the target(s) is within 10 percent, plus or minus, of the true range.

*Leader task
+Critical task

TASK PERFORMANCE SUMMARY BLOCK

ITERATION	1	2	3	4	5	TOTAL
TOTAL SUBTASKS AND STANDARDS EVALUATED						
TOTAL SUBTASKS AND STANDARDS "GO"						

OPFOR TASK and STANDARD:

TASK: MAINTAIN Operation Security

STANDARD:

The OPFOR does not present easily identifiable targets to the sniper.

ELEMENT: SNIPER TEAM

TASK: DEBRIEF (7-5-1009) (TC 23-14)

ITERATION 1 2 3 4 5 (circle)

TNG STATUS T P U (circle)

CONDITION: The sniper team completes the mission and conducts a debriefing. Both friendly and OPFOR units have indirect fire and CAS available.

TASK STANDARD:

1. All team members and the sniper employment officer are present.
2. All information is collected and recorded in the correct format.

SUBTASKS AND STANDARDS:	GO	NO-GO
1. The sniper employment officer designates an area for debriefing.		
a. The size of the area is large enough for the personnel.		
o S2.		
o Sniper employment officer.		

- o Sniper team.
- o Battalion commander or hie repreeentative.

b. The araa ia equipped with the neceeeery mapa.

c. The debriefing ia frae from all dietrectione.

*2. The eniper taam links up with the eniper employment officer.

a. Tha anipar taam linke up with the eniper employment officer at the time epecified in tha patrol order.

b. Tha location ia in e aacure area behind the FLOT.

3. The team membere end the sniper employment officer conduct the debriefing.

a. All membere ere preeent.

b. The eniper team hee ell recorded information.

- o Range cerd.
- o Field eketch.
- o Log book.

c. The team leeder conducte the debriefing in chronological order.

*Leeder taek

TASK PERFORMANCE SUMMARY BLOCK

ITERATION	1	2	3	4	5	TOTAL
TOTAL SUBTASKS AND STANDARDS EVALUATED						
TOTAL SUBTASKS AND STANDARDS "GO"						

(NO OPFOR TASK OR STANDARDS)

Appendix H

FOREIGN/NON-STANDARD SNIPER WEAPON SYSTEMS DATA

AUSTRIA

Systems currently in use: Steyr Model SSG 69 and SSG-PII rifles w/Kahles ZF69, ZF84, or RZFM86 telescopes.

The Austrian Scharf Schutzen Gewehr (Sharp Shootar's Rifle) 69 (SSG-69) is the current sniper weapon of the Austrian Army and several foreign military forces. It is available in either 7.62 x 51mm NATO or the .243 Winchester calibers. Recognizable features are: a synthetic stock (green or black) that is adjustable for the length of pull by a simple spacer system; hammer-forged, medium-heavy barrel; two-stage trigger, adjustable for weight of pull (A set trigger system is frequently seen); and a machined, longitudinal rib on top of the receiver that accepts several types of optical mounts. The mounting rings have a quick-release lever system that allows removal and reattachment of the optics with no loss of zero. The typical sighting system consists of the Kahles ZF69 6x42mm telescope; iron sights are permanently affixed to the rifle for emergency use. The SSG-PII (Politzei II) has a heavy barrel and does not have iron sights. The telescope comes equipped with a bullet drop compensator graduated to 800 meters, and a reticle that consists of a post with broken cross hairs. The Steyr SSG-69 has a well-deserved reputation for accuracy. The Kahles ZF-series of telescopes are zeroed with the same procedure used for Soviet telescopes. See Appendix I-4 for details.

Steyr SSG-69 Characteristics:

System of Operation: bolt action
Caliber: 7.62x51mm NATO
Overall length: 44.5 inches
Barrel length: 25.6 inches
Rifling: 4 groove, 1/12 inch right hand twist
Weight: 10.3 pounds
Magazine capacity: 5- or 10-round detachable magazine
Sights:
  Telescope: Kahles ZF-69 6x42mm; BDC: 100-800 m
  Front: hooded post
  Rear: notch
Ammunition requirement: The ZF-69 is designed for the NATO ball ammunition: 147/150 gn FMJBT @ 2800 fps. Some models of this telescope were designed for export to the USA and the BDC is calibrated for Federal's 308M load (168 HPBT @ 2600 fps). The K-ZF84 telescope is available with the following ballistic cams: .223/62 gn; .308/143 gn; .308/146 gn; .308/168 gn; .308/173 gn; .308/185 gn; and .308/190 gn.

BELGIUM

Systems currently in use: Fabrique Nationale Model 30-11.

The FN Model 30-11 is the current sniper rifle of the Belgian army. It is built on a Mauser bolt action with a heavy barrel, and a stock with an adjustable length of pull. The sighting system consists of the FN 4-power, 28-mm telescope and aperture sights with 1/6 MOA adjustment capability. Accessories include the bipod of the MAG machine gun, butt-spacer plates, sling, and carrying case.

FN Model 30-11 Characteristics:

System of operation: bolt action
Caliber: 7.62x51mm NATO
Overall length: 45.2 inches
Barrel length: 20.0 inches
Rifling: 4 grooves, 1/12 inch right hand twist
Weight: 15.5 pounds
Magazine capacity: 10-round detachable magazine
Sights:
Telescope: 4x with post reticle, range-finding stadia, and BDC: 100-600 meters
Front: hooded aperture
Rear: Anschutz match aperture micrometer adjustable for W/E, and fitted to mount on the rifle's scope base with a quick detachable mount
Ammunition requirement: 7.62x51mm NATO ball (147/150 gn FMJBT @ 2800 fps)

CANADA

Systems currently in use: Parker Hale Model C3.

The Parker Hale Model C3 is a modified target rifle (commercial Model 82 rifle, Model 1200 TX target rifle) built on the Mauser action. It was adopted in 1975. The receiver is fitted with two male dove-tail blocks, to accept either the Parker Hale 5E verner rearsight, or the Kahles 6x42mm telescope. The stock has a spacer system to adjust the length of pull.

Parker Hale Model C3 Characteristics:

System of operation: bolt action
Caliber: 7.62x51mm NATO
Overall length: 48.0 inches
Barrel length: 26.0 inches
Weight: 12.8 pounds
Magazine capacity: 4-round internal magazine
Sights:
Telescope: Kahles ZF-69 6x42mm; BDC: 100-800 m
Front: detachable hooded post

Rear: detecheble eperture
Ammunition requirement: 7.62x51mm NATO ball (147/150 gn FMJBT @ 2800 fps)

CZECHOSLOVAKIA

Systems currently in use: Model 54.

The current sniper weepon eyetem ie the vz 54 enıper rifle ("vzor" is the Czech word for "model;" therefore, "vz 54" is the eeme es "Model 54"). It ie e manuelly opereted, bolt ection, 10-round box, magezine-fed, 7.62x54mm Rimmed weepon. It ie built with e free-floeting berrel. Tbis weepon ie similer to the Soviet Ml891/30 sniping rifle; it ie ehorter end lighter. The rifle ie 45.2 inchee long end weighe 9.0 pounds with the telescope. It hee e muzzle velocity of 2,659 fps with e maximum effective renge of 1,000 meters.

FINLAND

Systems currently in use: Veime Silenced Sniper Rifle Mark 2

The Finnish ermed forces are using e 7.62x51mm NATO sniper rifle that is equipped with an integrel barrel/silencer assembly. The SSR Mk2 hes e fixed, self-oleening, and non-corrosive silencer. It hes e nonreflective plestic stock end en edjustable bipod. Through the use of edeptors, any telescopic or electro-opticel sight may be mounted. The weapon is not equipped with metellic sights. With subsonic emmunition, the SSR Mk2 hee e meximum effective renge of 200m.

SSR Mk2 Characteristics:
System of operetion: bolt ection
Caliber: 7.62x51mm NATO
Overell length: 46.5 inchee
Berrel length: 18.3 inches
Rifling: not known
Weight: 11 pounds
Magezine cepecity: 10-round internel megazine
Sights:
Telescope: verioue
Front: none
Rear: none
Ammunition requiremente: Subsonic (185 gn FMJBT @ 1050 fpe)

FRANCE

Systems currently in uee: MAS-GIAT FR-F1 end FR-F2.

The FR-F1 aniping rifle, known ea the Tireur d'Elite (aniper), waa adoptad in 1966. It ia based on the MAS 1936 bolt sction rifle. The length of pull may be adjuated with the removeable butt-apacer platea. This weapon'a sighting aystem consists of the Modal 53 bia 3.8x teleacopic aight and integral metallic sights with luminous spots for night firing. Standard equipment featuras a permanently affixed bipod whose lega may be folded forward into recesaes in the fore-end of the weapon. The barrel haa an integral muzzle brake/flaah auppreaaor. Thia weapon haa s muzzle velocity of 2,794 fpa and a maximum effective ranga of 800 meters.

MAS-GIAT FR-F1 Characteriatiea:

Syatem of operation: bolt action
Caliber: 7.62x51mm NATO or 7.5x54mm Franch
Overall length: 44.8 inchea
Barrel length: 22.8 inchea
Rifling: not known
Waight: 11.9 pounda
Magazina capacity: 10-round detachable box magazine
Sighta:
Telaacope: Modal 53, 3.8x
Front: hoodad poat
Raar: notch
Ammunition raquirament: not known

Tha FR-F2 aniping rifla ia an updatad varaion of the F1. Dimanaiona and operating charactariatica remain unchangad; howavar, functional improvamenta hava been mada. A heavy-duty bipod has bean mountad mora toward tha butt-and of tha rifla, adding aasa of adjustment for tha firer. Alao, tha major changa ia tha addition of a thick, plaatic tharmal alaave around and along tha length of tha barral. Thia addition aliminatea or reducea barral miraga and heat aignatura.

MAS-GIAT FR-F2 Characteriatica:

Syatem of operation: bolt action
Caliber: 7.62x51ma NATO
Overall length: 47.2 inchea
Barrel langth: 22.9 inchea
Rifling: 3 groovea, 1/11.6 right hand twiat
Weight: 13.6 pounds
Magazine capacity: 10-round detachable magazine
Sighta:
Telaacope: 6x42mm or 1.5-6x42mm Schmidt and Bender;
BDC: 100-600 m
Front: poat
Rear: notch
Ammunition requirement: 150 gn FMJBT @ 2690 fps

GERMANY

Systems currently in use: Mauser Model SP66, Walther WA 2000, and the Heckler & Koch PSG-1.

The Mauser Model SP66 is used by the Germans and also by about 12 other countries. This weapon is a heavy-barrelled, bolt-action rifle built upon a Mauser short action. It has a completely adjustable thumbhole-type stock. The muzzle of the weapon is equipped with a flash suppressor and muzzle brake.

Mauser SP66 Characteristics:

- System of operation: bolt action
- Caliber: 7.62x51mm NATO
- Overall length: not known
- Barrel length: 26.8 inches
- Rifling: not known
- Weight: not known
- Magazine capacity: 3-round internal magazine
- Sights:
  - Telescope: Zeiss-Diavari ZA 1.5-6x
  - Front: detachable hooded post
  - Rear: detachable aperture
- Ammunition requirement: not known

The Walther WA 2000 is built specifically for sniping. The entire weapon is built around the 25.6-inch barrel; it is a semi-automatic gas-operated bull-pup design that is 35.6 inches long. This unique weapon is chambered for .300 Winchester Magnum, but it can be equipped to accommodate 7.62x51mm NATO or 7.5x55mm Swiss calibers. The weapon's trigger is a single- or two-staged type. It can be fitted with various optics, but is typically found with a Schmidt & Bender 2.5-10x56mm telescope. It has range settings from 100 to 600 meters and can be dismounted and mounted without loss of zero.

Walther WA 2000 Characteristics:

- System of operation: semiautomatic
- Caliber: .300 Win Mag, 7.62x51mm NATO, 7.5x55mm Swiss
- Overall length: 35.6 inches
- Barrel length: 25.6 inches
- Rifling: not known
- Weight: 18.3 pounds
- Magazine capacity: 3-round detachable magazine
- Sights:
  - Telescope: Schmidt & Bender 2.5-10x56mm, BDC:..100-600 m
  - Front: none
  - Rear: none
- Ammunition requirement: not known

The Heckler & Koch Prazisions Schutzen Gewehr (Precision Marksman's Shooting Rifle) PSG-1 is an extremely accurate version of the G-3. It is a gas-operated, magazine-fed, semiautomatic

wespon with s fully adjustsble, pistol-grip-atyle atock. Heckler & Koch clsima that thia wespon will shoot aa sccurstely aa the inherent sccuracy of the ammunition. The 6x42mm Henaoldt hss LED-enhanced, illuminated crosshairs, elevstion sdjustmenta from 100 to 600 metera, and point blank aettings from 10 to 75 metsrs. Sight in requirea looaening two small screws located in the center of the windaga snd elevation knobs. Once the acrews sre looaened, the sdjuatment can be made to center the ahot group to correspond with one of the range aettings on the knobs. The sdjustments for both elevation and windsge move the impact of the bullet one cantimeter (.4") at 100 metera.

Heckler & Koch PSG-1 Chsrscteristics:

System of operstion: semisutomatic
Csliber: 7.62x51mm NATO
Overall langth: 47.5 inchea
Barrel length: 25.6 inchea
Rifling: polygonal, 1/12 right hand twiat
Weight: 17.8 pounds
Magazine capacity: 5- and 20-round detachsble magazine
Sighta:
Teleacope: 6x42mm Henaoldt with illuminatad reticla, BDC: 100-600 m
Front: none
Raer: nona
Ammunition raquirament: Lapua 7.62x51mm NATO Match: 185 FMJBT D46/D47 @ 2493 fpa

ISRAEL

Syatems currantly in uaa: Galil and M21 Sniping Rifla.

The Iaraalia copiad the beaic daaign, operstional charecteriatica snd configurstion of the Soviet AK-47 aaaault rifle to develop sn improved weapon to meet the damanda of the Iarseli army. The Galil aniping rifle ia a further svolution of this basic design. Lika moat aervice riflea modified for aniper uae, the weapon ia equipped with a heavier barrel fittad with a flash auppressor; it csn be aquipped with a ailancer and firsd with aubsonic ammunition. The weepon festures s piatol-grip-atyle atock, a fully adjustable cheekpiece, a rubber recoil psd, a two-atage trigger, and sn adjuatable bipod mounted to the rear of the fore-end of the rifle. Its sighting ayatem consists of s side-mountad 6x40mm talescope and fixed metallic sights. When firing FN Match ammunition, the weapon has a muzzle velocity of 2,672 fps; when firing M118 special ball ammunition, it haa a muzzle velocity of 2,557 fps. The apacificationa on the M21 can be found in the US section.

Galil Sniper Rifle Characteristics:

Syatem of operation: aemiautomatic

Calibar: 7.62x51mm NATO
Overall length: 43.9 inches
Barral length: 20 inches
Rifling: 4 groove, 1/12 right hand twist
Weight: 18.3 pounds
Magazine capacity: 5- or 25-round detachable magazine
Sights:
Telescope: 6x40mm Nimrod, BDC: 100-1000 m
Front: hooded post with tritium night sight
Rear: aperture with flip-up tritium night sight
Ammunition requirement: M118 (173 gn FMJBT @ 2610 fps)

ITALY

Systems currently in use: Beretta Sniper Rifle.

The Beretta rifle is the Italian sniper rifle. This rifle is a manually operated, bolt-action, 5-round box, magazine-fed weapon that fires the 7.62x51mm NATO. Its 45.9 inch length consists of a 23-inch heavy, free-floated barrel, a wooden thumbhole-type stock with a rubber recoil pad, and an adjustable cheekpiece. Target-quality, metallic sights consist of a hooded front sight and a fully adjustable, V-notch rearsight. The optical sight consists of a Zeiss-Diavari ZA 1.5-6x variable telescope. The weapon weighs 15.8 pounds with a bipod, and 13.75 pounds without the bipod. The NATO-standard telescope mount allows almost any electro-optical or optical sight to be mounted to the weapon.

PEOPLE'S REPUBLIC OF CHINA

Systems currently in use: Norinco Type 79.

The standard sniper rifle of the PRC is the Norinco Type 79, which was adopted in 1980. It is a virtual copy of the Soviet SVD. In many instances, they are nothing more than refinished and restamped Soviet SVDs that were once sold to the PRC. They have been imported into the U.S. under the designation of NDM-86. The specifications can be found under the Soviet SVD.

ROMANIA

Systems currently in use: Model FPK.

The FPK was adopted in 1970. This sniper rifle fires the Mosin/Nagant M1891 cartridge which has a case length that is 15mm longer than the 7.62x39mm Warsaw Pact cartidge. Since the bolt of the AKM travels 30mm (1.18 inches) further to the rear than is necessary to accommodate the 7.62x39mm cartridge, the Romanian designers were able to modify the standard AKM-type receiver

mechanism to fire the more powerful and longer-ranged 7.62x54mm rimmed cartridge. First, they altered the bolt face to take the larger rimmed base of the M1891 cartridge, added a new barrel, and lengthened the RPK-type gas piston system. The gas system of the Soviet SVD (Dragunov) sniping rifle is more like that of the obsolete Tokarev rifle. Second, the Romanians developed their own 10-shot magazine, and they fabricated a skeleton stock from laminated wood (plywood). This buttstock, with its molded cheek rest, is probably slightly better than the one used on the Dragunov. Third, the Romanians have riveted two steel reinforcing plates to the rear of the receiver to help absorb the increased recoil forces of the more powerful M1891 cartridge. Finally they have attached a muzzle brake of their own design. The standard AKM wire cutter bayonet will attach to this sniper rifle. The telescopic sight has English language markings.

FPK Characteristics:

System of operation: semiautomatic
Caliber: 7.62x54mm Rimmed
Overall length: 45.4 inches
Barrel length: 26.7 inches
Rifling: not known
Weight: 10.6 lbs
Magazine capacity: 10-round detachable box magazine
Sights:
Telescopic: LSP (Romanian copy of the Soviet PSO-1); BDC: 100-1000 m with 1100, 1200, and 1300 m reference points
Front: hooded post
Rear: sliding u-shaped notch
Ammunition requirements: see Soviet SVD comments

SPAIN

Systems currently in use: Model C-75.

The 7.62x51mm NATO C-75 special forces rifle is the current sniper rifle of Spain. This bolt-action weapon is built upon the Mauser 98 action. It is equipped with iron sights and has telescope mounts machined into the receiver to allow for the mounting of most electro-optic or optic sights. The weapon weighs 8-14 pounds.

SWITZERLAND

Systems currently in use: SIG Model 510-4.

The Swiss use the 7.62x51mm NATO SIG Model 510-4 rifle with a telescopic sight. The 510-4 is a delayed, blow-back-operated, 20-round, magazine-fed, semiautomatic or fully automatic weapon. With

bipod, telescope, and empty 20-round magazine, the weapon weighs 12.3 pounds. It is 39.9 inches long with a 19.8-inch barrel, and has a muzzle velocity of 2,591 fps.

UNITED KINGDOM

Systems currently in use: Lee Enfield Model L42A1, Parker-Hale Models 82 and 85, and the Accuracy International L96A1. The Lee Enfield No. 4 Mark 1 (T) is obsolete, but still found in use around the world

The L42A1 is the current standard sniper rifle. It is a conversion of the Lee Enfield No. 4 Mark 1 (T) .303, and was adopted in 1970. It has a heavy 7.62x51mm NATO barrel, and the fore-end is cut back. The original No. 32 telescope was renovated, regraduated, and redesignated the "Telescope Straight Sighting L1A1" which is marked on the tube along with the part number, O.S. 2429 G.A. The original No. 32 markings are usually still visible, cancelled out and painted over. New range graduations are read in metres instead of yards. Receivers from No. 4 Mark 1 (T) or Mark 1* (T) are used for this rifle. The magazine of the L42A1 is designed for 7.62mm NATO cartridges and has a capacity of 10 rounds. The butt stock has the same type "screw on" wooden cheek piece as used with the No. 4 Mark 1 (T). The left side of the receiver has a telescope bracket for the telescope No. 32 Mark 3. A leaf type rear sight and a protected blade type front sight are also used.

Lee Enfield L42A1 Characteristics:

System of operation: bolt action
Caliber: 7.62x51mm NATO
Overall length: 46.5 inches
Barrel length: 27.5 inches
Rifling: 4 grooves, 1/12 right hand twist
Weight: 12.5 pounds
Magazine capacity: 10-round detachable magazine
Sights:
    Telescope: L1A1, 3x, BDC: 0-1000 m
    Front: blade, with protecting ears
    Rear: aperture
Ammunition requirement: NATO ball, 147/150 gn FMJBT @ 2800 fps

The Parker Hale Model 82 sniper rifle is a bolt-action 7.62x51mm NATO rifle built upon a Mauser 98 action. It is a militarized version of the Model 1200 TX target rifle. It is equipped with metallic target sights and the Pecar V2S 4-10x variable telescope. An optional, adjustable bipod is also available.

Parker Hale Model 82 Characteristics:

System of operation: bolt action
Caliber: 7.62x51mm NATO
Overall length: 48.0 inches
Barrel length: 26.0 inches
Rifling: not known
Weight: 12.8 pounds
Magazine capacity: 4-round internal magazine
Sights:
Telescope: Pacar V2S 4-10x
Front: detachable hooded post
Rear: detachable aperture
Ammunition requirement: 7.62x51mm NATO ball (147/150 gn FMJBT @ 2800 fps)

The Model 85 sniper rifle is a bolt action 7.62x51mm rifle designed for extended use under adverse conditions. It uses a McMillan fiberglass stock that is adjustable for length of pull. The telescope is mounted on a quick-detachable mount that can be removed in emergencies to reveal a flip-up rear aperture sight that is graduated from 100-900m.

Parker-Hale M85 Characteristics:
System of operation: bolt action
Caliber: 7.62x51mm NATO
Overall length: 47.5 inches
Barrel length: 24.8 inches
Rifling: 4 grooves, 1/12 right hand twist
Weight: 12.5 pounds
Magazine capacity: 10-round detachable magazine
Sights:
Telescopic: Swarovski ZFM 6x42mm (BDC: 100-800 m) or ZFM 10x42mm (BDC: 100-1000 m)
Front: protected blade
Rear: folding aperture
Ammunition requirement: NATO ball, 147/150 gn FMJBT @ 2800 fps

The L96A1 sniper rifle is built by Accuracy International using a unique bedding system designed by Malcolm Cooper. It features an aluminium frame with a high-impact plastic, thumbhole-type stock; a free-floated barrel; and a lightweight-alloy, fully adjustable bipod. The rifle is equipped with metallic sights that can deliver accurate fire out to 700 meters and can use the L1A1 telescope. The reported accuracy of this weapon is 0.75 MOA at 1,000 meters. One interesting feature of the stock design is a spring-loaded monopod concealed in the butt. Fully adjustable for elevation, the monopod serves the same purpose as the sand sock that the US Army uses.

Accuracy International Model PM/L96A1 Characteristics:
System of operation: bolt action

Caliber: 7.62x51mm NATO, .243 Win, 7mm Rem Mag, 300 WM
Overall length: 47.0 inches
Barrel length: 26 inches
Rifling: 1/12 right hand twist
Weight: 15 pounds
Magazine capacity: 10-round detachable magazine
Sights:
Telescope: 6x42mm or 12x42mm Schmidt and Bender
Front: none
Rear: none
Ammunition requirement: not known

The Lee Enfield Rifle No. 4 Mark 1 (T) and No. 4 Mark 1* (T) are sniper versions of the No. 4. They are fitted with scope mounts on the left side of the receiver and have a wooden cheek rest screwed to the butt. The No. 32 telescope is used on these weapons.

Lee Enfield No. 4 Mark 1 (T) Characteristics:
System of operation: bolt action
Caliber: .303 British
Overall length: 44.5 inches
Barrel length: 25.2 inches
Rifling: not known
Weight: 11.5 pounds
Magazine capacity: 10-round detachable magazine
Sights:
Telescope: No. 32, 3x, BDC: 100-1000 yards
Front: blade with protecting ears
Rear: vertical leaf w/ aperture battle sight or L type
Ammunition requirement: .303 ball with a muzzle velocity (at date of adoption): 2440 fps

UNION OF SOVIET SOCIALISTIC REPUBLICS

Systems currently in use: SVD (Dragunov).

The Self-loading Rifle, Dregunov (SVD) is a purpose-designed system that replaced the M1891/30 sniper rifle in 1963. The bolt operation of the SVD is similar to that of the AK/AKM. The principle difference is that the SVD has a short stroke piston system. It is not attached to the bolt carrier like that of the AK/AKM, and delivers its impulse to the carrier, which then moves to the rear. The remainder of the operating sequence is quite similar to the Kalashnikov-series assault rifle. The rifle has a somewhat unusual stock in that a large section has been cut out of it immediately to the rear of the pistol grip. This lightens the weight of the rifle considerably. It has a prong-type flash suppressor similar to those used on current US small arms. It is equipped with metallic sights that are graduated to 2,000 meters and the PSO-1 4-power telescopic sight with a battery-powered,

illuminated reticle. The PSO-1 also incorporates a metascope that when activated, is capable of detecting an active, infrared source. The PSO-1 is designed for the ballistic trajectory of the "LPS" ball round. The windage knob provides 2 MOA per click and 4 MOA per numeral. The reticle pattern has 10 vertical lines to the left and right of the aiming chevron. These lines are spaced 4 MOA from each other, therefore providing 40 MOA to the left and right of the aiming chevron.

SVD Characteristics:

System of operation: semiautomatic
Caliber: 7.62x54mm rimmed
Overall length: 47.9 inches
Barrel length: 24.5 inches
Rifling: 4 grooves, 1/10 right hand twist
Weight: 9.7 pounds
Magazine capacity: 10-round detachable magazine
Sights:
    Telescope: 4x PSO-1, BDC: 0-1300 m
    Front: hooded post
    Rear: tangent with notch
Ammunition requirement: LPS ball (149 gn FMJBT @ 2800 fps)

Warsaw Pact Ammunition: The standard M1908 Russian "L" ball cartridge features a 149 grain lead-core spitzer bullet with a gilding metal jacket and a conical hollow base. The "L" ball gives about 2800 fps from the M1891/30 rifles. It can be identified with a plain, unpainted, copper-colored bullet.

The "LPS" ball cartridge is a 149 grain boattail with a gilding metal-clad steel jacket and mild steel core. The LPS cartridge can be identified by a white or silver bullet tip, distinguishing it from the lead-core "L" ball. Velocity is around 2820 fps.

The M1930 heavy ball sniper load is known as the Type "D" and is sometimes identified by a yellow bullet tip. It features a 182 grain full metal jacket bullet with a hollow-base boat tail and develops 2680 fps from the M1891/30 or the SVD.

The general rule for identfying Soviet/Warsaw Pact ammunition is as follows: when the head of the cartridge case is oriented so that both numbers can be read, the factory number appears at 12 o'clock and the date of manufacture appears at 6 o'clock.

Mosin-Nagant Bolt Action Sniper Rifle Model M1891/30:

The M1891 was adopted as the Russian army service rifle in 1891. It has a blade front sight with a leaf rear sight graduated in archins (paces) from 100 to 3200, (2496 yards). In the 1930's the improved M1891/30 was fielded. The M1891/30 has a hooded front sight and a tangent rear sight graduated from 100 to 2000 meters. The M1891/30 sniper rifle was adopted shortly thereafter, with its only modification being the addition of a telescopic sight. Details on the telescope will be found in

Appendix I.

M1891/30 Chereceteristics:
System of operatioo: bolt ection
Cslіber: 7.62x54mm rimmed
Ovorell length: 48.5 inches
Barrel length: 28.7 inches
Rifling: 4 groove, 1/10 right band twist
Weight: 11.3 pounds
Magazino cepacity: 5-round eemi-fixed magezine
Sights:
Telescope: PU 3.5x or PE 4x telescope
Front: hooded poet
Reer: tengent rear, gredueted from 100-2000 m
Ammunition requirement: L or LPS ball (149 gn FMJ @ 2800 fps)

UNITED STATES OF AMERICA

Syetems ourrently in use: tbe M24 end M21 SWSs.

The US Army eniper weepon systems ere the M24 end M21. The USMC hes edopted e product-improved vereion of the Remington 700 end is ourrently known se the M40A1. Speciel epplicetion sniper rifles such es the Berrett Model 82 end the RA1 Model 500 ere used on en orgenized, but limited baeis. Numerous non-stendard sniper riflee ere used by different US Government end DOD egencies. Aleo, obsolete sniper rifles ere still baing used ebroad. These include the M1901A4, M1C, end the M1D.

M24 SWS:
The M24 entered eervice in 1988 to selected US Army units. It ie the first purpose-built eniper rifle ever edopted by the Army. It is beeed on the Remington Model 700 long ection; thie will permit the leter conversion to the .300 Winchester Magnum certridge. The M3A Ultre telescope has the mil dot reticle syetem for renge finding purposes. The ballistic cem is designed for the M118 emmunition end provides e ooe-revolution trajectory compensetion for 100-1000 meters. The telescope cen be removed in the field if necessery; detechable terget sights ere the back-up. H-S Precision makes the fibergless/kevler stock thet is unique due to its eluminus bedding block. This stock elimineted the effects of weether end moisture oo the system. A detechable Herris bipod cen be ettached to the edditional sling swivel stud provided on the fore-end Tho length of pull is edjusteble to sccommodete the essigned individuel.

M24 Characteristics:
System of operetioo: bolt ection
Celiber: 7.62x51mm NATO
Overell length: 43-45.7 inches
Berrel length: 24 inches

Rifling: 5 groove, 1/11.2 right hand twist
Weight: 14.1 pounds
Magazine capacity: 5-round internal magazine
Sights:
Telescope: L&S M3A Ultra, mil dot, BDC: 100-1000m
Front: detachable hooded post with replaceable inserts
Rear: detachable aperture
Ammunition requirement: M118 Match/Special Ball (173 gn FMJBT @ 2610 fps)

M21 Sniper System:

In Sep 1968 the Army Materiel Command was directed to produce 1800 National Match M-14s for immediate shipment to Vietnam. From 1968 until 1975, when the XM-21 was adopted, several NM M-14 variants with different telescopes were shipped to Vietnam for use. The first XM-21s used the WW II-era M84 telescope. Jamna Leatherwood, the designer of the ART-series provided most of the telescopes, although others were used. The M21 is carefully assembled to National Match standards with selected components. The stock was originally an epoxy-impregnated walnut or birch stock. The rifle has NM iron sights. The elevation and windage adjustments provide 1/2 MOA corrections. The scope mount is mounted to the side of the receiver with a large knurled knob. Later mounts provided two points of attachment with an additional knob threaded in to a modified clip guide. The M21 was type-classified with the ART I. The ART II was later used on a limited basis, and the M3A Ultra has been used to upgrade the M21 system.

NOTE: USSOCOM is currently developing an upgraded version of the M21 and it will be fielded as the new Light Sniper Rifle (LSR).

M21 Characteristics:
System of operation: semiautomatic
Caliber: 7.62x51mm NATO
Overall length: 44.3 inches
Barrel length: 22 inches
Rifling: 4 groove, 1/12 right hand twist
Weight: 14.4 pounds
Magazine capacity: 20-round detachable magazine
Sights:
Telescope: ART I or ART II, BDC: 300-900 m
Front: protected post
Rear: hooded aperture
Ammunition requirement: M118 Match or Special Ball (173 gn FMJBT @ 2610 fps)

USMC M40A1:

The M40A1 is the current USMC sniping rifle that is the culmination of 20 years of use of the Remington Model 700 since the Vietnam War. It is built by match armorers to exacting standards using selected components. It uses Remington M700 and 40X receivers mated to a heavy McMillan/Wiseman stainless steel match

barrel. The stock is made by McMillan. The Unertl 10x USMC sniper scope has the mil-dot reticle and a BDC designed to range from 100 to 1000 yards.

M40A1 Characteristics:

System of operation: bolt action
Caliber: 7.62x51mm NATO
Overall length: 44 inches
Barrel length: 24 inches
Rifling: 6 groove, 1/12 right hand twist
Weight: 14.4 pounds
Magazine capacity: 5-round internal magazine
Sights:
Telescope: Unertl 10x, BDC: 100-1000 yards
Front: none
Rear: none
Ammunition requirement: M118 Match or Special Ball (173 gn FMJBT @ 2610 fps), or Federal Match with the 180 gn Sierra MatchKing bullet

Barrett Model 82A1:

The Barrett Model 82 sniping rifle is a recoil-operated, 11-round detachable box, magazine-fed, semiautomatic chambered for the .50 caliber Browning cartridge. Its 36.9-inch fluted barrel is equipped with a six-port muzzle brake that reduces recoil by 30 percent. It has an adjustable bipod and can also be mounted on the M82 tripod or any mount compatible with the M60 machine gun. This weapon has a pistol-grip-style stock, is 65.9 inches long, and weighs 32.9 pounds. The sighting system consists of a telescope, but no metallic sights are provided. The telescope mount may accommodate any telescope with 1-inch rings. Muzzle velocity of the Model 82 is 2,849 fps.

Iver Johnson Model 500:

The Ivar Johnson Model 500 is the current version of the Research Armaments Industry (RAI) Model 500/Daisy Model 500. The Model 500 long-range rifle is a bolt action, single-shot weapon, that is chambered for the .50 caliber Browning cartridge. It has a 33-inch heavy, fluted, free-floating barrel. With its bipod, fully adjustable stock and cheekpiece, and telescope, it weighs a total of 29.92 pounds. The weapon is equipped with a harmonic balancer that dampens barrel vibrations, a telescope with a ranging scope base, and a muzzle brake with flash suppressor. The USMC and USN use this weapon, which has a muzzle velocity of 2,912 fps.

NON-STANDARD U.S. SNIPER RIFLES

Remington Models 40XB, 40XC, and 700 rifles:

These variations of the Remington M700 bolt action rifle are widely used. The M700 is the standard rifle. The M700 and its variants have tubular/round actions which are preferred by many competitors due to its ease of truing and bedding It is most

frequently seen in the heavy barreled "Varmint Spacial" version. The 40XB ia a aingle-shot competitinn rifle, and is extramely accurate. The 40XB has a solid magazine well that adds to the action'a rigidity. The 40X or 40XC ia similar to the XB except they have a magazine well, atripper clip guide, and are designed for uaa in high power rifle competitinn. Tha M24 SWS is built on a Ramington M700 action marked M24 M700. It is built to the same exacting standards as the 40XB's are built with. The original M24 came with a Rnck 5R barrel. The new M24s from Remington come with s Ramington hammar-fnrged barrel. Moat Remington .308 rifles (M700, 40XB, and 40XC) come witb a short action, for reduced ection aize, incressad action rigidity, and reduced bolt cycling distance. The M24 wsa sdopted with a inng actinn so thst it could be convartad to tha .300 Winchestar Magnum cartridge at a later date. This will be sccompiiahed by replacing tha barrel and bolt. In thia magnum chambering the M24 will be dasignsted the Medium Sniper Rifla (MSR), and be affactive nut to 1200 matars. The BDC nn the Leupnid & Stevens M3A will ba replaced to mstch tha different belliatic trajectnry.

Semington Modala 40X/700 Characteriatica:

- **Syatem of operation: bolt action**
- **Caliber: 7.62x51mm NATO (.308 Win), .300 Win Mag, snd nthara**
- **Ovsrsll lsngth: spproximataly 42 inches (dependent on bbl lengtb)**
- **Sarrel lengtb: 22-26 inches**
- **Rifling: 4-6 gronve, 1/10-1/12 right hsnd twiat**
- **Weight: 10-15 pounds**
- **Magszine capscity: 5-round atandard calibars, 3 round magnum cslibers, intsrnsi magazine; 40XB ia aingle ahnt.**
- **Sights:**
  - **Tslsscnpa: L&S Ultrs/Mark IV M1A, M3A; Unertl 10x USMC; Bausch & Lomb 10x40mm Tactical; nthar**
  - **Front: none**
  - **Rear: nnne**
- **Ammunition requirsment: varisd**

Winchester Model 70:

Tha Modal 70 in .308, nr .300 Win Mag, when properly built, ia alan a very effective and accurate rifle, ss provan by the multiple natinnal and international competitora that use tham. Winchastar now makas a trua shnrt action, in calibar .308 aa a varmint rifle which can ba an altarnativa to the M700 Remington. The Winchester Model 70 haa s square-bottomed actinn.

Other systems:

A. McMillsn systams: Tba M-86SR (.308 Win), M-86LR (.300 Win Mag), and M-89 (.308 suppreaaed) are bolt-actinn riflea built nn McMiiian actions. The M-88ELR, M-87ELR, and M-87R are .50 cal bolt riflea. The McMillan M-40 is a Remington ahort action barrelled with a

McMillan .308 match barrel. A variety of optics are available: L&S Ultra/Mark IV M1A, M3A, 3.5-10x Law Enforcement; the Bausch and Lomb 10x40mm tactical; and the Phrobis tactical rifle telescopes

B. Robar systems: Accurized Remington Model 700 rifle
C. Barrett Firearms: M82, M82A1 light semi .50 cal rifles, and the M90 bolt action .50 cal rifle
D. Iver Johnson Convertible Long Range Rifle System

Iver Johnson Convertible Long Range Rifle Characteristics:

System of operation: bolt action
Caliber: 7.62x51mm NATO, 8.58x71mm (.338/.416)
Overall length: 46.5 inches
Barrel length: 24 inches
Rifling: 4 groove; 1/12 (7.62), 1/10 (8.58) right hand twist
Weight: 15 pounds
Magazine capacity: 4-round (7.62), 5-round (8.58), detachable magazine
Sights:
Telescope: varied
Front: none
Rear: none
Ammunition requirement: 8.58x71mm; 250 gn HPBT 3,000 fps

OBSOLETE U.S. SNIPER RIFLES

M1903A4 Springfield:

The M1903A4 was adopted in Dec 1942 as a sniper rifle during WW II. The only modification to the standard service rifle was the addition of a pistol grip and optical sight. There were numerous telescopic sights used, but the most common were the M84 and the Weaver Model 330C (marked M73B1 for the contract). There are a few 1903's that were meticulously assembled with selected parts for sniper use, but as a general rule, the majority were standard service rifles. The low magnification of the telescopes (2.2x for the M84) made long-range target interdiction difficult. The M84 scope will be discussed in Appendix I. The Model 1942 is a Marine Corps modification of the 1903A1, fitted with a 8x Unertl scope. These rifles were manufactured by Remington, Springfield Armory, and the L.C. Smith Corona Typewriter company.

M1903A4 Characteristics:

System of operation: bolt action
Caliber: Caliber .30 M1/M2 ball (7.62x63mm/30-06)
Overall length: 43.5 inches
Barrel length: 24 inches
Rifling: 4 groove (and 2 groove), 1/10 right hand twist
Weight: 9.4 pounds
Magazine capacity: 5-round internal magazine
Sights:
Telescope: M84, M73B1 Weaver (Model 330C), or the M73 Lyman Alaska; BDC: 0-900 yards

Front: none
Rear: none
Ammunition requirement: Caliber .30 M1/M2 ball (150 FMJ flat base @ 2800 fps

Garand M1C and M1D:

In 1939 the Springfield Armory and Winchester began production of the M1. The M1 was the first self-loading rifle that withstood battlefield use. The M1C and M1D were developed for designated marksman use. The M1D was fitted with steel collar around the barrel in front of the receiver, which was tapped for a side-mounted scope mount, because the weapon loads through the top of the receiver. A M84 2.2x scope was used. A specially fabricated leather extension was affixed to the left side of the stock to provide a solid stock weld to accommodate the side-mounted telescope. This was so the shooter could rest his cheek and fire left eyed. Although the rifle can be fired right eyed it was designed to be fired left eyed. It is a fallacy to this day that the leather stock extension is a cheek piece; it is not. It was and is a rest for use with the side- mounted scope. The majority of the M1D's were also fitted with a prong-flash hider. The M1C is identical to the M1D except in one respect. The M1C has a side mount that was tapped into the left side of the receiver directly instead of using a collar around the barrel. Like the M1903A4, nothing was done to the majority of the rifles to accurize them. Eventually, hand-assembled M1D's and C's were made and used.

M1C/D Characteristics:

System of operation: semiautomatic
Caliber: .30 Caliber M1/M2 ball (7.62x63mm/30-06)
Overall length: 43.6 inches
Barrel length: 24 inches
Rifling: 4 grooves, 1/10 right hand twist
Weight: 11.8 pounds
Magazine capacity: 8-round en-bloc metallic clip
Sights:
Telescope: M84, 2.2x, BDC: 0-900 yards
Front: protected post
Rear: aperture
Ammunition requirement: M1/M2 ball (150 gn FMJ flat base bullet @ 2800 fps)

YUGOSLAVIA

Systems currently in use: Model M76.

The Yugoslav armed forces use the M76 semiautomatic sniping rifle. It is believed to be based upon the FAZ family of automatic weapons; it features permanently affixed metallic sights, a pistol-grip-style wood stock, and a 4x telescopic sight. The telescopic sight is graduated in 100-meter increments from 100 to 1,000

meters, and the optical sight mount allows the mounting of passive nightsights. It has a muzzle velocity of 2,361 fps.

M76 Characteristics:

System of operation: semiautomatic
Caliber: 7.92x57mm (8mm Mauser), 7.62x54mm R, 7.62x51mm NATO
Overall length: 44.7 inches
Barrel length: 21.6 inches
Rifling: not known
Weight: 11.2 pounds
Magazine capacity: 10-round detachable
Sights:
    Telescope: 4x, BDC: 100-1,000m
    Front: hooded post
    Rear: tangent
Ammunition requirement: 7.92x57mm (2361 fps); 7.62x51mm NATO (2657 fps)

Appendix I

SNIPER RIFLE TELESCOPES

I-1. CHARACTERISTICS OF RIFLE TELESCOPES

Teleacope Magnification

The average unaidad human eye can distinguiah 1-inch detail at 100 metera. Magnification, combined with quality lens manufacture and deaign, permits reaolution of thia 1-inch divided by the optical magnification. The general rule ia 1x magnification per 100 metera. The magnification (power) of a teleacope ahould correapond to the maximum effective range of the weapon ayatem being used. Thia will enable the operator to identify preciae corrections. For example, a 5x teleacope ia adequate out to 500 metera; a 10x ia good out to 1000 metera. The beat all around magnification datarminad for fiald-type aniping ia the 10x becauaa it permita tha operator to identify preciae corractiona out to 1000 metara. Tha field of view of a 10x at cloaa range, while amall, ia atill anough to aae larga and amall targets. Higher-powarad taleacopaa have very limitad fiald of viawa, making cloaa range and anap targat angagamanta difficult. Subatandard high powarad talascopea may be hard to focua and hava parallax problema. Soma markamen atill prafer lower-powarad talascopea.

Parallax

Parallax raaulta whan tha targat ia not focuaad on tha aama focal plana aa tha reticle. Whan parallax ia praaant, tha targat will move in ralation to tha raticla whan the aniper movaa hia haad (changea hia apot wald) whila looking through tha talaacopa. It ia more apparant in high-powarad talaacopea. With parallax, tha error will not affact the atrika of the bullet mora than 1/2 tha diametar of tha objective lena out to 2 timaa tha zaro diatanoa. .For example, with a zaro at 100m, the error would be leaa than approximataly 1 inch at 200m. It ia recommendad that the aniper zero hia ayatem at the greateat distance poasible. For a 1000m ayatem, zero at 500m. Tha M1A and M3A Ultra/Mark IV by L&S have a focua/parallax knob on the left aide of the teleacope. With tha M1A and M3A, it ia imperative that the aniper adjuat hia focua/parallax when he zeroa hia ayatem and never adjuat it again until he re-zeroa. If the focua/parallax ia adjuated during ahooting, the point of impact will change from the previoualy eatabliahed zero.

Adjustable Objective Lens

Adjuatable objective lenaea for focusing at different magnificationa and rangea are becoming quite common. Some target taleacopea (auch aa the M1A and M3A) have a third turret knob on the aide of the teleacope that will focua the objective lens. Unfortunately, many teleacopes have neither and muat be dealt with on an individual basis.

Variable Power Telescopes

Vsriable power teleacopes have had a bad reputsion for a shifting point of impect when the magnification is changed from the original magnificstion that the system was sighted in with. Modern, high quslity, variable telescopes do not seem to have this problem anymore. This has been tested on teupold's 6.5-20x target telescope. After zeroing it showed no varistion in the point of sim versus the peint of impact at any rsnge or sny power. Of course, it is prudent to tast the ayatem during live-fire exercises to esteblish the optic's relisbility.

I-2. TELESCOPE ADJUSTMENTS

Focusing

Focusing the telescope to the individual assigned the waapon is important. Most teleacopea' ocular lens can be adjusted for minor eya relief edjustments and to obtain a crisp, clesr picture of tha retiole. To do this, look at a distant object for severel saconds without using the teleacope. Then shift your vision quickly, looking through tha teleecope et e plein beckground. The reticle pattern should be sherp and cleer before your eye refocuses. If you need to make en edjustment to match your eyes, hold the eyepiece lock ring end loosen the eyepiece by turning it counter-clockwise severel turns. Then, with e quick glence recheck the imege. To compensete for neersightedness, turn the eyepiece clockwiss; for farsightedness, turn the eyepisce counter-clockwise. Aftar determining the precise focus for your eye, be sure to retighten the look ring securely egeinst the eyepiece to hold it in position.

> **CAUTION:** Nevar look at the sun through the telescope. Concentretion of strong aoler reys cay cauas aarious aye damage.

Eye Relief

Propar eye relief is esteblished very aimply. First, loosen the scope ringa' ellen screwa so that the telescope is fras to move. Get into the shooting position that will be used most fraquently and slide the scope forwerd or beck until e full, crisp picture is obteined. Thara should be no ahading in the view. This will be enywhare from 2-4 inchee from the operator's eye depending on the telascope. Rotate the telescope until the reticle crosshsirs ara perfectly verticel end horizontel, then tighten the ring screws.

The M-24 has e one-piece telesnope base that has two sets of machined grnoves that ellow the telescope to be mounted either forwsrd or back to edjust for personal comfort. If that range of adjustment is not sufficient, the telescops can be edjusted after the mounting ring lock screws ere loosened.

I.3 UNITED STATES TELESCOPES

M84 Telescopic Sight

The M84 telescopic sight has a magnification of 2.2x. It has a field of view of 27 feet at 100 yards. The maximum field of view is obtained with an eye relief of 3 1/2 to 5 inches. The reticle consists of a vertical post and a horizontal crosshair (Figure I-3-1). The post is 3 MOA in width. The sight is sealed with rubber seals and may be submerged without damage (not recommended due to age). The windage knob has 60 MOA of adjustment, 30 MOA from center left or right. However, there is a total of 100 MOA adjustments available to zero the telescope for misalignment. To adjust the strike of the bullet vertically, turn the knob to the higher numbers to raise the point of impact, and to lower numbers to lower the point of impact. A complete turn of the elevation knob provides 40 MOA of adjustment. 1 click of the elevation or windage knob equals 1 MOA. The elevation scale starts at 0 yards and goes up to 900 yards with graduations every 50 yards. There is a numbered graduation every 100 yards.

Zeroing: To zero the scope, shoot at a target at 100 or 200 yards. Adjust the elevation and windage until the point of aim and point of impact are the same. Turn out the set screws on both the elevation and windage knobs to "zero" them. Rotate the windage dial until the windage (deflection) is on the zero marking for the no-wind zero. Set the range (elevation) knob to the distance used for the zeroing procedure. This telescope is mounted on both the M1C and D, and the M1903A4.

Adjustable Ranging Telescope I (ART I)

The ART I automatically compensates for trajectory when a target of the proper size is adjusted between the stadia lines. It is a 3-9x variable that compensates for targets from 300 to 900 meters. It has a one-piece ballistic cam/power ring. The ballistic cam is set for the ballistic trajectory of the M118 Match or Special Ball ammunition (173 gn FMJBT @ 2610 fps). Each click or tick mark on the adjustment screws is worth 1/2 MOA in value. The ART I is zeroed at 300 meters. Set the power ring to 3 (3x/300m). Remove the adjustment turret caps. Fire the rifle and adjust the elevation and windage adjustment screws until the point of impact is the same as the point of aim. Screw the turret caps back on to maximize the water-proofing of the telescope.

The reticle has four stadia lines on it (Figure I-3-2). The two horizontal stadia lines are on the vertical crosshair, are 30 inches apart at the designated distance, and are used for ranging. The vertical crosshair and horizontal stadia lines are used to range targets from the beltline to the top of the head. Adjust the power/cam until the stadia lines are bracketing the target's beltline and top of head. The numeral on the power ring is the target distance. For example, if the power ring reads 5, the target is at 500m, and the scope is at 5x magnification. The

ballistic cam has automatically adjusted the telescope for the trajectory of the round by changing the telescope's point of aim. Aim center mass on the target to obtain a hit in a no-wind situation. The two vertical stadia lines are on the horizontal crosshair, are 60 inches apart at the designated distance, and are used for wind holdoffs and leads. If necessary, holdoff for environmental effects or target movement.

NOTE: It is imperative to keep the scope base clean. The cam slides along the mount and pushes the telescope off from the bearing surface. Debris can interfere with the precise camming and ranging functions.

Adjustable Ranging Telescope II (ART II)

The ART II is similar in operation and design to the ART I, with two major modifications. The ballistic cam and the power ring are now separable and can be moved independently of one another. This was done so that after ranging a target, the ballistic cam can be locked to permit the operator to increase the magnification for greater definition. The problem with this system is that it seldom works correctly. The two rings are locked together in poker-chip tooth fashion, and even when locked together, they can move independently. When unlocked, it is very difficult to move one without the other moving, creating a change in the camming action, and ultimately, causing misses. It is best to lock them together and keep them together. The mount is similar to the ART I mount, and the bearing surface must be kept clean. The ART II mount has two mounting screws, one of which is threaded into a modified clip guide. The reticle is the second major modification. The reticle pattern is a standard crosshair, with thick outer bars on the left, right, and bottom crosshairs (Figure I-3-3). The horizontal crosshair has two dots, one on each side of the crosshair intersection. Each dot is 30 inches from the center, and are a total of 60 inches apart. The heavy bars are one meter in height or thickness at the range indicated. To determine the range to a target, adjust the power ring and cam together until the target is of equal height to the bar. The correct placement of the bar is from the crotch to the top of head (one meter). Aim center mass for a no-wind hit. The cam can be read to determine the range.

Leupold & Stevens M1A and M3A Ultra/Mark 4 10x or 16x

The M1A comes in either 10x or 16x. It has three large, oversize target knobs. The left knob (as seen from the sniper) is for focus/parallax adjustment. The top knob is for elevation adjustment. The right knob is for windage adjustment. The M3A is only available in 10x. It has the same knob arrangement as the M1A, but the knobs are smaller, and they have different click values. All L&S sniper telescopes use the mil dot reticle (Figure I-3-4). The M3A has a ballistic cam to compensate for the trajectory of the specified cartridge. The cam is calibrated for bullet drop compensation from 100m to 1000m. The following are available:

- 7.62mm NATO M118 (173 FMJBT @ 2610 fps)
- .300 Win Mag (220 HPBT @ 2650 fps)
- .30-06 Springfield (180 HPBT @ 2700 fps)
- 5.56mm M193/.223 Rem (55 FMJBT @ 3200 fps)

Adjustments of L & S telescopes:

Model	Elevation	Windage	Complete Revolution
M1A	1/4 MOA	1/4 MOA	15 MOA
M3	1 MOA	1 MOA	100-1000M
M3A	1 MOA	1/2 MOA	100-1000M

NOTE: Due to the mechanics of the M1-M3 telescopes, when zeroing, set the focus/parallax adjustment knob and keep it in the zeroed location. It has been found that adjustment of the focus/perellax knob after the zero is established can change the point of impact.

Bausch & Lomb Tactical Riflescope

The Bausch & Lomb Tactical Rifleascope is a 10x40mm fixed magnification telescope with 1/4 MOA adjustments. It has two large, target-type knobs. The upper knob is for elevation, and the knob on the right is for windage. The eyepiece houses the range focus adjustment ring, that is calibrated from 50 yards to infinity. It has the same mil dot reticle pattern as the L&S series and USMC Unertl telescope (Figure I-3-4). Each revolution of the adjustment knobs provides 12 MOA.

Unertl USMC Sniper Scope

This telescope was designed and built by the John Unertl Company. John Unertl was a USMC sniper during WWI and later became the manufacturer of some of the finest US-made optics. USMC sniper scope is a fixed 10x, steel-tubed, mil dot telescope with a ballistic drop compensator for the M118 ammunition. The lens are coated with a high efficiency, low-reflection (HELR) film that transmits up to 91 % of the ambient light. This telescope has 1/2 MOA adjustments for both elevation and windage. It has a fine tune elevation capability that permits +/- 3 MOA to adjust for differences in shooter's zeros, temperatures, ammunition lots, and ammunition. The windage adjustment has 60 MOA of main adjustment with +/- 4 MOA fine adjustment. This telescope also has a parallax adjusting capability. The reticle is identical to that of the L&S series and the Bausch and Lomb Tactical (Figure I-3-4).

I-4. SOVIET TELESCOPES

The Soviet telescopes are made on machinery purchased from Carl Zeiss of Germany during the 1930's. Their optical quality is therefore good to excellent. Their operation is atraightforward, and rather simple. Only the PE aeries has the capability of individually focusing to the user. The top turret is for elevation adjuatment, and has a ballistic cam that is calibrated for the 7.62x54mm Rimmsd L ball ammunition (150 gn FMJ flat base @ 2800 fps). The turret on the left is for windage adjustments.

The zeroing procedures ere identical for all Soviet telescopss. Zsroing should be done at 100 metsrs. Loosen the small screwa on the turrets that hold the top plate to the cam that is engraved with the tick marks and numerela. Several turns are all thet it neceasary. On not remove theae acrewa completely; they are not captive, and are easily loat. Uaing a amall acrewdriver, gently pry the the top plate and cam apert ao that the top plate can move indspsndsntly of tha cam. Firing three-shot groups, adjuat the elevation and windage knoba until the point of aim and the point of impact are the aame. When making adjuatmenta, move the reticle to the shot group. Thia ia the major difference from zeroing these telsscopea when compared to zeroing modern, U.S.-atyle teleacopea where the ahot group ia moved to the reticle (point of aim). When the rifle/teleacope ayatem ia zeroed, "zero out" the cema. The elevetion cam ahould be turned until the "1" which repreaenta 100 metera ia aiigned with the reference tick mark. Eneure thet the top plate doea not rotate when the cem ie moved. The windage cem ia eleo centered on ita "0" marking. Puah down on the top platea until they mate with the cama. Carefully tighten the emell metei acrewa. The teleacope ia now zeroed.

M1891/30 Sniper Teleacopsa:

Model	Magnification	BDC	Tube Diameter
PE	4x	0-1400m	1 inch
PU	3.5x	0-1300m	30mm
PV	3.5x	0-1300m	30mm

Translation of a Soviet Manual

The teleacope ia composed of a telescope tuba and a mount.

o Telescope Tube

On ths top of the tube ia an elevation range knob, consisting of a acrew end a drum, marked with numbers from 1-14 on the PE acope end from 1-13 on the PU scope. Each graduation is equivalent to 100 meters in diatance.

At the left rear aide of the acope ia a windage knob. The

components of the windage knob are the same as that of the elevation-range knob. The windage knob is used to compensate for the effects of wind on the trajectory of the bullet. The windage knob has 10 graduations: the middle one is marked with the number 0.

To move the strike of the bullet to the right, turn the windage knob to the direction of the mark "+", and conversely, turn the knob to the direction of the mark "-" to move the strike of the bullet to the left. Each click of windage corresponds to one mil.

The telescope tube contains a system of optical glasses including convex lenses, prisms and an eyepiece. The reticle is a cross-wire type. When aiming the rifle at the objective, place the vertical line of the reticle right on the objective. The horizontal line is used to adjust the sim. The two knobs provide horizontal and vertical movement of the reticle.

The telescope tube PE has adjusting devices. When taking aim, adjust the knobs on the tube to fit with the observer's eye.

The telescope tube PU has no adjusting (focusing) devices. Therefore, when aiming, the observer is required to look through the telescope and move his head until the sighted object is in focus.

When using a telescope to sim at the objective, place the eye at the center of the eyepiece, thus forming a sight alignment toward the objective. An accurate sim will not allow the observer to see any black spots in the telescope. (If aiming inaccurately, the observer will see a small, black, crescent-shaped spot in the telescope.)

o Mount

Mounts used to fix the telescopes to the rifle: the mount for PE consists of a base and a body. Fix the base to the receiver of the rifle with six screws. The body of the mount, after being fastened to the base, is used to fix the telescope to the rifle.

The mount for PU also includes a base and a body. The base, after being screwed to the receiver of the rifle, is connected with the body of the mount by guide lugs and screws. The body of the mount may be moved up and down on the base thanks to the two screws on the upper side and the rear lower side of the base. The body is used to fix the telescope to the rifle.

We can loosen the three screws in order to rotate the sighting telescope, but we only loosen the screws when we fire for adjustment at the repair station of the regiment.

PSO-1:

The PSO-1 acope will be found mounted on the Soviet SVD and the Romanien FPK. The PSO-1 ia 4x, and haa an illuminated reticle powered by a amall dry cell. The bettery houaing is located at the bottom reer of the teleacopic sight mount. To change batterias, press in and rotate the bettery housing counterclockwise. Remove the old battery end repiece it with the seme type. The reticle lemp can be repleced by unscrewing its houaing and removing the bulb (The RPG-7 sight uses the same bulb). Tha raticle light is turnad on or off by ita switch. The lena cap ahould alweys be in plece except whan the telaacope ia in use. Two covers are isauad with each rifle; one is for the telescopic sight alone and the other covera the aight and breech when tha PSO-1 ia mounted. A belt pouch is provided for carrying the teleacope when dismounted from tha rifle, four magezinea, e cleening kit, end an axtra bettary end lemp.

If the open sighte are to be uaed, aet the rear aight by praaaing in the locks on the rear sight slida; than move the slide elong the reer sight leaf. The front edge of the slide should be eligned with the numerel thet corresponds in hundreds of meters. Uee the same eight picture as for firing a pistol.

If the PSO-1 is used, rotete the elevetion knob until the figure that corresponds to the renge in hundreds of meters is eligned with the index. The renge cen be feirly eccurately determined by use of the renge finder located in the lower left of the telescopic reticle (Figure I-4-2). This renge finder is greduated to the height of e man (5'7") from 200-1000m. Look through the telescope end plece the horizontel line et the bottom of the terget. Move the telescope untii the upper (curved) line just touches the top nf the terget'e head. The number indicetes the renge in hundreds nf meters; if the terget fells between numbers, the remaining distence must be estimated. When the renge ie determined end set into the elevetion knob, use the point of the top chavron on tha raticle as an eiming point. The three lower chevrons ere uaad for firing at 1100, 1200, end 1300 meters with the elavation knob set at 10.

The horizontal acale extanding out from the sides of the top chevron ere uaad for hesty wind and lead corrections; each tick mark is worth 1 aoviet mil (6000 aoviet miils per 360 degreas). The horizontal acele is numbered every 5 and 10 mils. Deliberate changea ere made by rotating the windaga knob. The windage knob is graduated every 1/2 aoviet mil. The windage knob scele has two (2) clicks per graduation, eech click representing one half mil (.5 mil), aach graduetion one (1) mil. At 1000 metera aach click moves tha impect of the round .5 meters (20 in), each graduation moves the impect 1 matar (40 in). The numbera on the windage knob ara colored. Right windage corrections are bleck, and era obtained when tha knob is rotatad clockwise. Left windage correctiona ere rad, end ere obtained when the knob ia rotated counterclockwise.

For firing when the light is dim, illuminate the reticle by turning on the switch in the telescopic sight mount. If active infrared light sources are believed to be used by the enemy, set the range drum at 4 and switch the infrared detector into place. Scan the area to the front; if any active infrared light sources are in use, they will appear as orange-red blobs in the telescope. Align the point of the reticle on the light and fire. Turn off the reticle when not in use to conserve the battery and swing the infrared detector out of the way so that it will be activated by light during the day. Several hours of direct sunlight are required to activate the infrared detector.

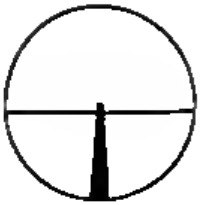
If the correct dry cell batteries can not be obtained, a suitable expedient can be easily assembled (Figure I-4-3). The Soviet dry cell is 5.0 volts. The following are required:

- Two (2) 1.25 Volt/625 camera batteries (lithium)
- One (1) 3.0 Volt/DL2025 camera battery (lithium)
- One plastic bushing OD:0.85"; ID:0.60"; Length:0.73"

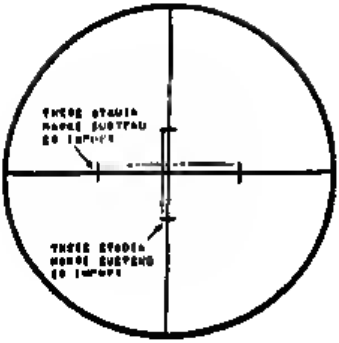
Place the batteries positive "+" side first into the battery compartment. The large, flat DL2025 is placed in first, then the bushing, then the two 625 batteries. Replace the battery compartment cap.

M84

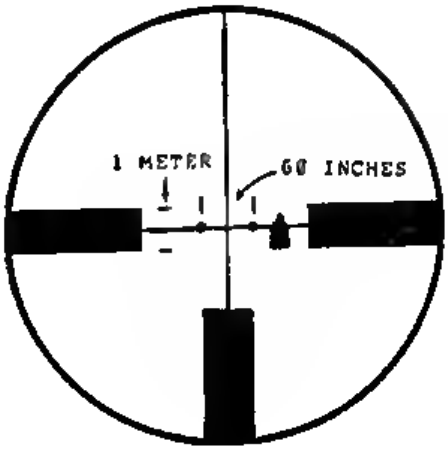
I-3-1



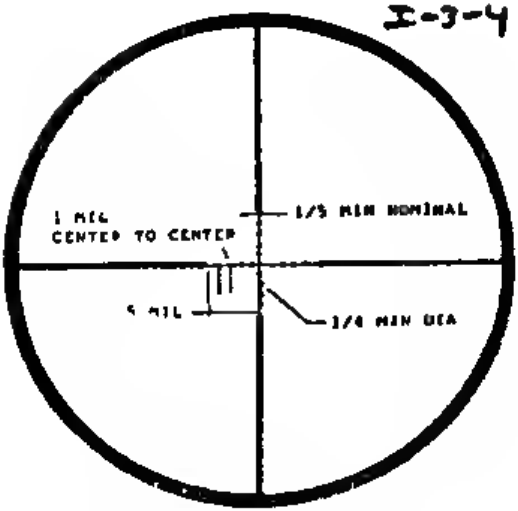
I-3-2



I-3-3



I-3-4



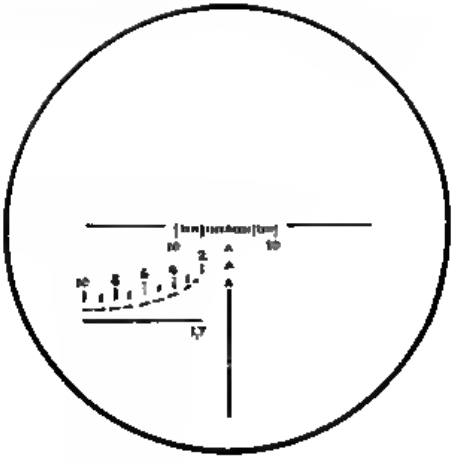
L/S 4 B/L /UNEVEN

I-4-1

SOVIET
PE/PU/PV

I-4-2

PSO-1

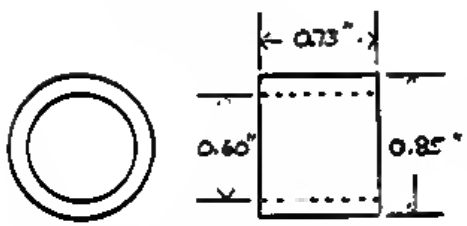


I-4-2

PSO-1

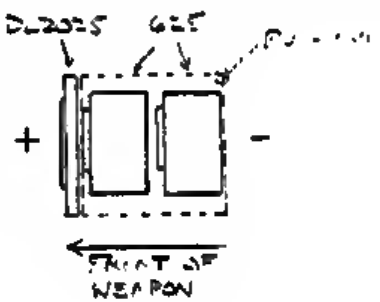
PSO-1 EXPEDIENT BATTERY
(NOT TO SCALE)

BUSHING



FRONT VIEW SIDE VIEW

BATTERY PLACEMENT



Appendix J

SPECIAL OPERATIONS TARGET INTERDICTION COURSE
2E-F67/011-F19

PROGRAM OF INSTRUCTION

FILE #	TITLE
	General Subjects
8301	Introduction to Special Operations Target Interdiction Course (SOTIC)
8302	Rigging of the Sniper Weapon System
8304	Mission Planning
8305	Sniping on Urbanized Terrain
8306	Training SOF Snipers
8307	Selecting and Tailoring Ammunition
8308	Considerations for Use of Special Operations (SO) Snipers
8310	Introduction to Tracking and Countertracking
	Marksmanship
8311	The M24 Sniper Weapon System (SWS) and Sniper Equipment
8312	Advanced Rifle Marksmanship
8313	Sniper Marksmanship
8314	Sight Adjustment and Zeroing
8315	Correcting for Meteorological Conditions
8316	Range Exercise #1 (Position Shooting)
8320	Judging Distances
8321	Judging Distances Demonstration
8322	Judging Distances Exercise
8323	Reading Wind and Spotting

8327 Range Exercise #2 (Grouping and Zeroing - TS)

8328 Range Exercise #3 (Snapshooting)

8329 Range Exercise #4 (Moving Targets)

8330 Range Exercise #5 (Dawn and Dusk Shooting)

8332 Range Exercise #6 (Opposite Hand Shoot)

8333 Range Exercise #7 (Opportunity Targets)

8334 Introduction to Night Vision Devices (NVDs)

8335 Range Exercise #8 (Zero the NVD on the M24 SWS)

8336 Application of Fire

8337 Range Exercise #10 (Alternate U.S. SWS)

8338 Range Exercise #9 (Night Firing with the NVD)

8341 Field Shooting

Observation

8351 Observation of Ground

8352 Observation Exercise

8353 Observer's Log and Range Card

8354 Panoramic Sketching

8355 Locating the Enemy

8357 Kim's Game

Concealment

8361 Individual Camouflage and Concealment

8362 Concealment Exercise

8364 Ghillie Suite

8365 Individual Movement

8369 Selecting Lines of Advance

8372 Stalking Exercise

8373 Silent Movement Course

8378 Sniper Hides and Loopholes

8379 Hides Demonstration

Examination Annex

8381 Written Examination

8387 ARTEP 7-92 MTP MO 3, STX 15

8388 Advanced Rifle Markemanship

8389 Sniper Marksmanship

Appendix K

SNIPER'S LOG BOOK

9 STEPS FOR A FIRST SHOT HIT

1. DETERMINE THE RANGE IN METERS--SET.
   TAKE SLOPE INTO ACCOUNT.
2. DETERMINE THE BASE WIND:
   A. IN MOA--SET. OR:
   B. MILS FOR HOLDOFF. 1 MIL=3.375 MOA
   1/4m=.64 MOA, 1/2m=1.66 MOA, 3/4m=2.53 MOA
   NOTE: WHEN DETERMINING BASE MINDS, ENSURE YOU KNOW HOW THE MIRAGE LOOKS UNDER THE BASE CONDITION, SO YOU CAN SEE CHANGES. FOR A CONSISTENT CHANGE, DIAL IN THE CHANGE. KEEP TRACK OF GUSTS AND LULLS. GUSTS GO CLOCKWISE FROM THE BASE WIND DIRECTION, LULLS GO COUNTER-CLOCKWISE. HOLD OR FAVOR INTO A GUST, HOLD OR FAVOR OUT OF A LULL. LULLS ARE MOST DANGEROUS--THEY REQUIRE THE LARGEST CORRECTION.
3. DETERMINE THE SPIN DRIFT CORRECTION:
   600-700 M - LEFT 1/2 MOA
   600-900 M - LEFT 3/4 MOA
   1000 M - LEFT 1 MOA (M118)
4. DETERMINE THE TEMPERATURE CHANGE FROM "0" AND SET:
   100-500 M +/- 20 DEGREES = -/+ 1 MOA
   600-900 M +/- 15 DEGREES = -/+ 1 MOA
   1000 M +/- 10 DEGREES = -/+ 1 MOA
5. DETERMINE THE PRESSURE CHANGE VERUS "0" PRESSUBE AND SET.
6. DETERMINE THE ALTITUDE CHANGE FROM "0" AND SET.
7. DETERMINE LEAD (IF A MOVING TARGET).
6. ASSUME A GOOD POSITION:
   A. BONE SUPPORT
   B. MUSCULAR RELAXATION
   C. NATURAL POINT OF AIM ON THE AIMING POINT
9. FIRE THE SHOT:
   A. NATURAL RESPIRATORY PAUSE
   B. FOCUS ON THE FRONT SIGHT/RETICLE
   C. FOLLOW THROUGH
   NOTE: KEEP THE ROUNDS COVERED, SO THEY WILL STAY AT A CONSTANT TEMPERATURE. A HOT GUN WILL STRING ROUNDS RIGH. LOG ALL SHOTS AND SUBSEQUENT CHANGES.

WIND DATA

1. DETERMINE DIRECTION OF:
   A. AVERAGE WIND
   B. GUSTS (ALMOST ALWAYS CLOCKWISE)
   C. LULLS
2. DETERMINE VELOCITY OF:
   A. AVERAGE WIND
   B. GUSTS
   C. LULLS
3. PUT THE CORRECTION FOR THE AVERAGE WIND ON THE SIGHT.
4. SLIGHTLY FAVOR, OR HOLD FOR GUSTS AND LULLS.
5. HOLD OR FAVOR INTO A GUST.
   HOLD OR FAVOR OUT OF A LULL.
6. IF A CONSISTENT HOLD OR FAVOR, PUT THE CORRECTION ON THE SIGHT.
7. REFERING TO YOUR TARGET DIMENSIONS IN MINUTES OF ANGLE.
   A. SLIGHTLY--1/2'
   B. FAVOR--1'
   C. HOLD--1 1/2-2'
8. LULLS ARE MORE DANGEROUS THAN GUSTS.
9. YOU CANNOT USE MIRAGE AS A VELOCITY INDICATOR UNTIL YOU KNOW WHAT IT LOOKS LIKE FOR THE AVERAGE WIND. THIS WILL CHANGE THROUGHOUT THE DAY.
10. SHOOT THE CONDITION. DO NOT CHASE SPOTTERS.
11. IGNORE MINOR FLUCTUATIONS. WAIT FOR THE CONDITION TO FULLY CHANGE. MIRAGE WILL CHANGE BEFORE CONDITIONS ARRIVE.
12. GRASS WILL GIVE YOU MAGNITUDE OF THE WIND, BUT NOT DIRECTION OR VELOCITY.
13. OBSERVER COMPUTES CORRECTION IN MINUTES, AND GIVES IT TO SHOOTER IN CLICKS OR MIL HOLDOFF.

CONSOLIDATED ZERO DATA

METERS:	100	200	300	400	500	600	700	800	900	1000
Temp. E/W:										
50										
55										
60										
65										
70										
75										
80										
85										
90										
95										
100										
105										

NOTE: This matrix is designed to compile data on the individual SWS's zero at these ranges and temperatures.

The table below gives the inch equivalents of mils at the given ranges of 91 meters to 1,000 meters and 100 yards to 1,000 yards. This will aid the sniper in computing his sight change in mils for a given distance to the target with a given miss in estimated inches.
For example, a miss of 28 inches left at 400 yards would be a 2 mil hold to the right.

RANGE	INCHES	RANGE	INCHES
91 meters (100 yds)	3.6	549 meters (600 yds)	22.0
100 meters	4.0	600 meters	24.0
183 meters (200 yds)	7.0	640 meters (740 yds)	25.0
200 meters	8.0	700 meters	27.5
274 meters (300 yds)	11.0	731 meters (800 yds)	29.0
300 metere	12.0	800 metere	31.5
365 meters (400 yds)	14.0	823 meters (900 yds)	32.5
400 meters	15.75	900 meters	35.5
457 meters (500 yds)	18.0	914 meters (1,000 yds)	36.0
500 meters	20.0	1,000 meters	39.0

METRIC ENGLISH EQUIVALENTS

1 MOA (CM)	ENGLISH YARDS	METRIC METERS/YARDS	METERS	1 MOA (IN)
3	109	100	91	1
4.5	164	150	137	1.5
6	219	200	183	2
7.5	273	250	228	2.5
9	328	300	274	3
10.5	383	350	320	3.5
12	437	400	365	4
13.5	492	450	411	4.5
15	546	500	457	5
16.5	602	550	503	5.5
18	656	600	549	6
19.5	711	650	594	6.5
21	766	700	640	7
22.5	820	750	686	7.5
24	875	800	731	8
25.5	929	850	777	8.5
27	984	900	823	9
28.5	1039	950	869	9.5
30	1094	1000	914	10
31.5	1148	1050	960	10.5
33	1203	1100	1005	11

LEADS IN MILS

RANGE	WALKERS	FAST WALKERS	RUNNERS
100 yds	LEADING EDGE	7 /8	1 3/4
200 yds	7/8	1 1/4	1 3/4
300 yds	1 1/8	1 3/4	2 1/4
400 yds	1 1/4	1 3/4	2 1/2
500 yds	1 1/4	1 3/4	2 1/2
600 yds	1 1/2	2 1/4	3
700 yds	1 1/2	2 1/4	3
800 yds	1 1/2	2 1/2	3
900 yds	1 3/4	2 1/2	3 1/2
1,000 yds	1 3/4	2 1/2	3 1/2

LEADS IN MOA

100 yds	LEADING EDGE	3	6
200 yds	3	4.5	6
300 yds	4	6	8
400 yds	4.5	6	9
500 yds	4.5	6	9
600 yds	5	7.5	10
700 yds	5	7.5	10
800 yds	5.5	8	11
900 yds	5.5	8	11
1,000 yds	5.5	8	11

LEADS IN FEET AND INCHES

100 yds	LEADING EDGE	3"	6"
200 yds	6"	9"	1'
300 yds	1'	1.5'	2'
400 yds	1.5'	2.25'	3'
500 yds	2'	3'	4'
600 yds	2.5'	3.75'	5'
700 yds	3'	4.5'	6'
800 yds	3.5'	5.25'	7'
900 yds	4'	6'	8'
1,000 yds	4.5'	7.25'	9'

It is not recommended that you engege runners beyond 500 meters due to the excessive lead required. If a runner is engaged at distances beyond 500 meters, an immediate follow-up shot must be ready.

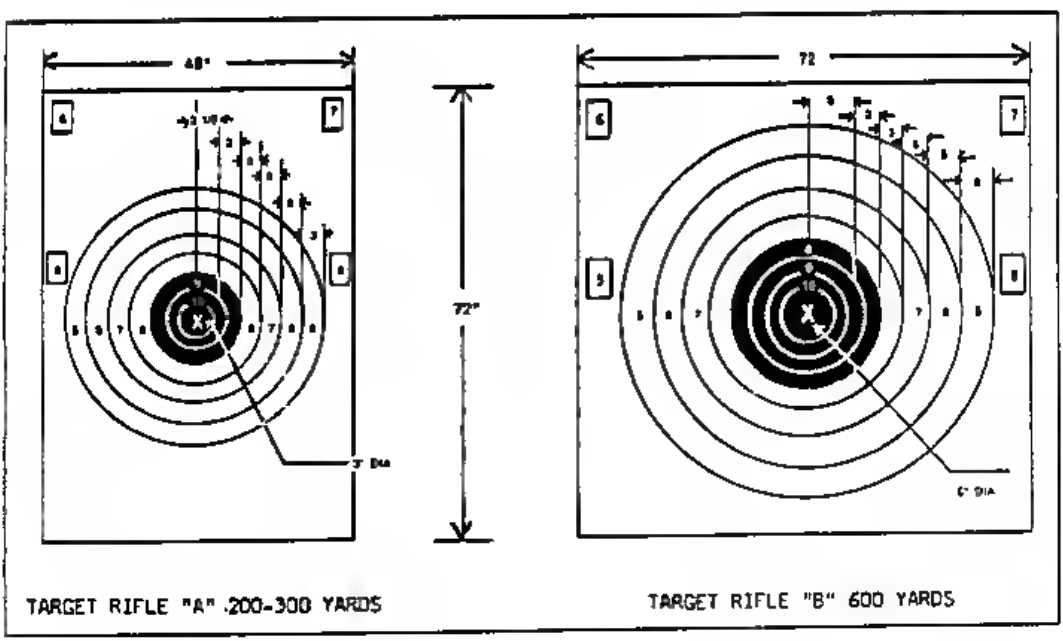
The classificetion of a walker, fast walker, and a runner is based on a walker moving at 2 miles per hour, a fast walker at 3 1/2 miles per hour, and a runner at 5 miles per hour.

It must be remembered that the above leads are guides only and starting point leads. Each individual will have hiw own leads based on how he parceives movement and his reaction time to it.

SOTIC

APPENDIX K

SPECIAL OPERATIONS TARGET INTERDICTION



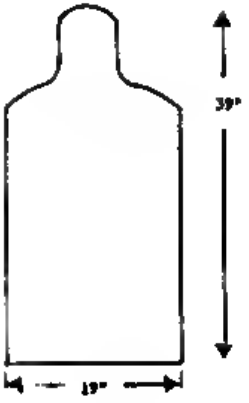
TARGET RIFLE "A" 200-300 YARDS

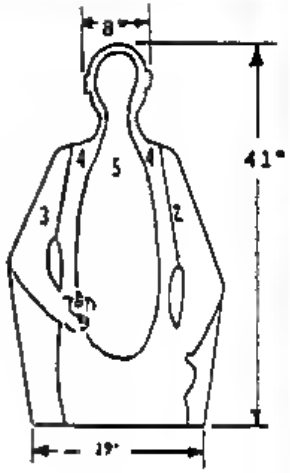
TARGET RIFLE "B" 600 YARDS

FBI

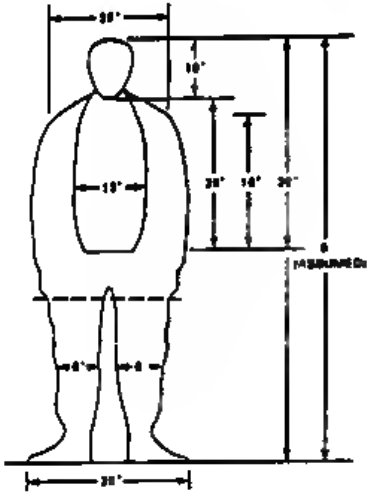
MOVER

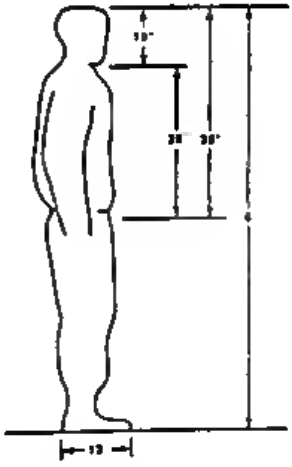
"E" TYPE





SILHOUETTE DIMENSIONS





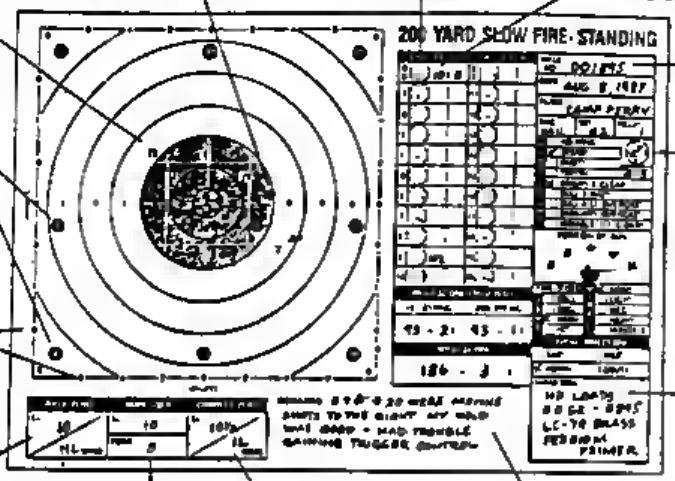
	NIL	1M	MOA	MIL/1N	5	10	15
	5	200	2"	0	.25	.5	.7
	4.75	210					
	4.5	222					
	4.25	235			.3	.6	.9
	4	250		9			
	3.75	267	3"	10			
	3.5	206		11	.35	.7	1
	3.25	308	3.5	12	.4	.0	1.25
	3	333		13	.45	.9	1.35
	2.75	364	4"	14	.5	1	1.5
	2.5	400	4.5	16	.55	1.1	1.65
	2.25	444	5"	18	.65	1.3	1.95
	2	500	5.5	20	.75	1.5	2.25
*	1.75	571	6.5	22	.0	1.6	2.4
*	1.66	600	7"	24	.95	1.9	2.05
*	1.5	667	7.5	26	1	2	3
*		700	8"	20	1.2	2.3	3.45
*		750	0.5	30	1.2	2.4	3.6
**	1.25	800	9"	32	1.4	2.7	4
**		900	10"	36	1.6	3.2	4.8

100 - 5 under
200 - 2.5 under
300 - 1.5 under
400 - 1.25 under
500 - zero
600 - 1 over
700 - 1.25 over

W	
R	M

*spin .5L MOA
**spin 1L MOA

HOW TO USE YOUR SLOW FIRE DATA SHEETS



PLOT AN ACCURATE SHOT LOCATION BY THE SHOT NUMBER AS INDICATED BY POSITION OF SPOTTING DISK ON THE TARGET MARK SIGHTERS WITH AN ⊗

PLACE A DOT IN CALL CIRCLE WHERE YOU BELIEVE YOUR SHOT WILL APPEAR ON THE TARGET.

RECORD ELEVATION AND WINDAGE USED FOR EACH SHOT MAKE CHANGES AS THEY OCCUR

SHOT VALUE AS INDICATED BY POSITION OF SCORING DISK PLACED ON TARGET

GRID OVERLAY INDICATES SIGHT MOVEMENTS IN MINUTES FROM CENTER OF TGT FOR BOTH ELEVATION AND WINDAGE.

RECORD DATA AS INDICATED

MARK WIND DIRECTION WITH ARROW

CHECKMARK WIND LIGHT POSITION OF SUN TEMP MIRAGE AND FIRING DIRECTION

RECORD ESSENTIAL AMMO DATA

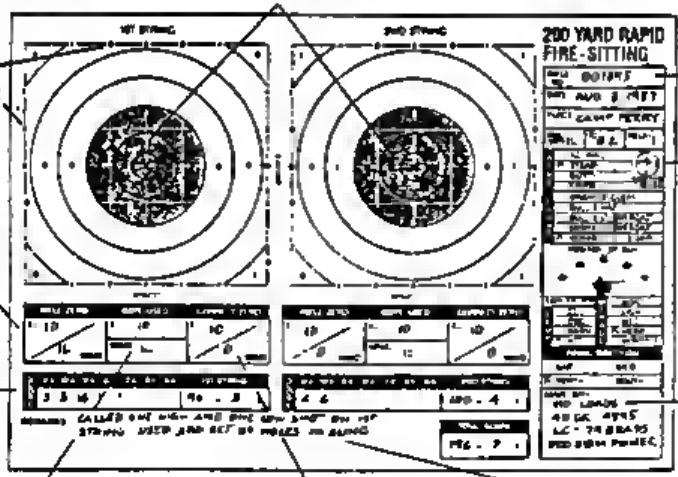
RECORD ELEVATION AND WINDAGE REQUIRED TO HIT THE CENTER OF TGT ON CALM DAY WITH NO WIND. (RIFLE ZERO)

RECORD ELEVATION USED AND WINDAGE REQUIRED TO HIT CENTER OF TGT FOR THIS STRING OF FIRE

RECORD CORRECT RIFLE ZERO MAKE CHANGE TO ZERO IF STRING OF FIRE INDICATES THIS IS NECESSARY

ENTER ANY REMARKS PERTINENT TO THIS STRING OF FIRE OR ITEMS FOR A REMINDER

HOW TO USE YOUR RAPID FIRE DATA SHEETS



PLOT AN ACCURATE SHOT GROUP FOR EACH STRING OF FIRE BY MARKING AN X FOR EACH SHOT HOLE INDICATED ON THE TGT. WITH SPOTTING DISKS.

GRID OVERLAY INDICATES SIGHT MOVEMENTS IN MINUTES FROM CENTER OF TGT FOR BOTH ELEVATION AND WINDAGE

RECORD ELEVATION AND WINDAGE REQUIRED TO HIT THE CENTER OF TGT ON CALM DAY WITH NO WIND (RIFLE ZERO)

RECORD SCORE AS INDICATED ON SCORE BOARD ATTACHED TO SCORED TGT

RECORD DATA AS INDICATED

MARK WIND DIRECTION WITH ARROW

CHECKMARK WIND LIGHT POSITION OF SUN TEMP MIRAGE AND FIRING DIRECTION

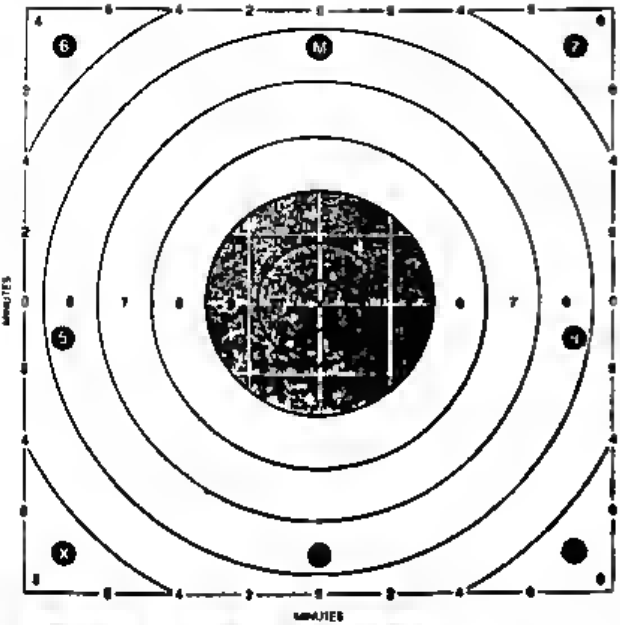
RECORD ESSENTIAL AMMO DATA

RECORD ELEVATION USED AND WINDAGE REQUIRED TO HIT CENTER OF TGT FOR THIS STRING OF FIRE.

RECORD CORRECT RIFLE ZERO. MAKE CHANGE TO ZERO IF STRING OF FIRE INDICATES THIS IS NECESSARY

ENTER ANY REMARKS PERTINENT TO THIS FIRING OR ITEMS FOR A REMINDER

200 YARD SLOW FIRE - STANDING



CALL	EL	WD	CALL	EL	WD
9			8		
10			11		
1			12		
2			13		
3			14		
4			15		
5			16		
6			17		
7			18		
8			19		
9			20		

1ST STRING	2ND STRING
— X	— X

TOTAL SCORE — X

RIFLE NO
DATE
PLACE
RNG | TGT | RELAY

WIND: NO WIND, STEADY, GUSTY, FISHTAIL

LIGHT: BRIGHT & CLEAR, DULL & HAZY, DULL & LT OVERCAST, DARK HVY OVERCAST, VARIABLE LT & DARK

POSITION OF SUN

TIME

TEMP: COLD, COOL, WARM, HOT

MIRAGE: NONE, LIGHT, MED, HEAVY, VARIABLE

FIRING DIRECTION: EAST, WEST, NORTH, SOUTH

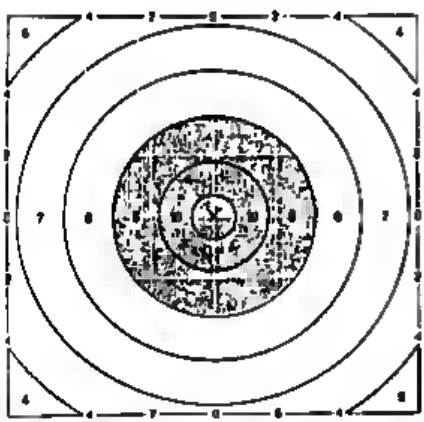
AMMO DATA

RIFLE ZERO	DOPE USED	CORRECT ZERO
EL / WIND	EL / WIND	EL / WIND

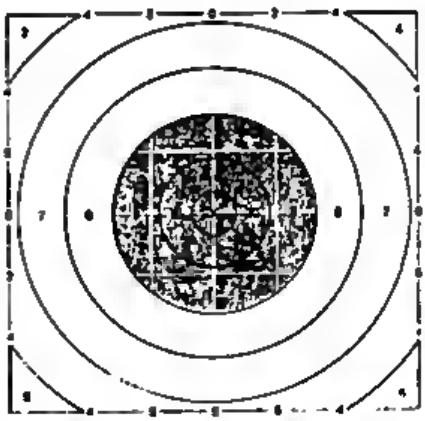
REMARKS.

200 YARD RAPID FIRE - SITTING

1ST STRING



2ND STRING



RIFLE ZERO	DOPE USED	CORRECT ZERO
EL / WIND	EL / WIND	EL / WIND

SCORE	X	10	9	8	7	6	5	1ST STRING
								— X

SCORE	X	10	9	8	7	6	5	2ND STRING
								— X

TOTAL SCORE — X

RIFLE NO
DATE
PLACE
RNG | TGT | RELAY

WIND: NO WIND, STEADY, GUSTY, FISHTAIL

LIGHT: BRIGHT & CLEAR, DULL & HAZY, DULL & LT OVERCAST, DARK HVY OVERCAST, VARIABLE LT & DARK

POSITION OF SUN

TIME

TEMP: COLD, COOL, WARM, HOT

MIRAGE: NONE, LIGHT, MED, HEAVY, VARIABLE

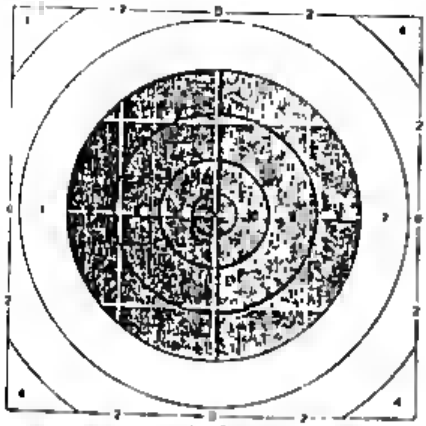
FIRING DIRECTION: EAST, WEST, NORTH, SOUTH

AMMO DATA

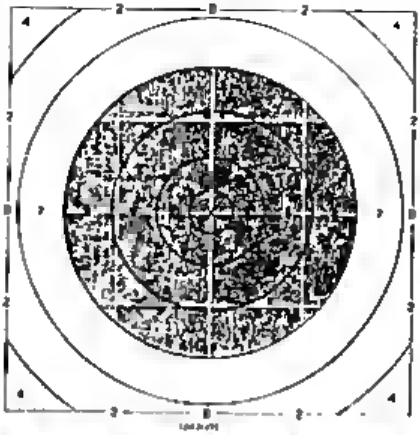
REMARKS

300 YARD RAPID FIRE · PRONE

1ST STRING



2ND STRING



RIFLE ZERO	DOPE USED	CORRECT ZERO
EL / WIND	EL / WIND	EL / WIND

RIFLE ZERO	DOPE USED	CORRECT ZERO
EL / WIND	EL / WIND	EL / WIND

SCORE	X	10	9	8	7	6	5	1ST STRING

SCORE	X	10	9	8	7	6	5	2ND STRING

REMARKS

TOTAL SCORE

RIFLE NO

DATE

PLACE

RNG | TGT | RELAY

WIND: NO WIND · STEADY · GUSTY · FISHTAIL

LIGHT: BRIGHT & CLEAR · DULL & HAZY · DULL & LT OVERCAST · DARK HVY OVERCAST · VARIABLE LT & DARK

POSITION OF SUN

TIME

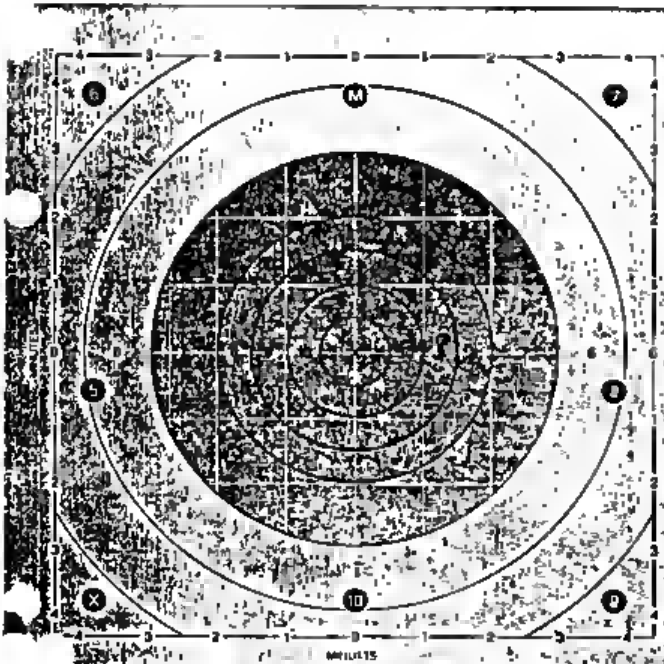
TEMP: COLD · COOL · WARM · HOT

MIRAGE: NONE · LIGHT · MED · HEAVY · VARIABLE

FIRING DIRECTION: EAST · WEST · NORTH · SOUTH

AMMO DATA

600 YARD SLOW FIRE · PRONE



SHOT	CALL	EL	WD	SHOT	CALL	EL	WD
SS				10			
1				11			
2				12			
3				13			
4				14			
5				15			
6				16			
7				17			
8				18			
9				19			
10				20			

READ SCORE FROM PLOT

1ST STRING | 2ND STRING

TOTAL SCORE

RIFLE NO

DATE

PLACE

RNG | TGT | RELAY

WIND: NO WIND · STEADY · GUSTY · FISHTAIL

LIGHT: BRIGHT & CLEAR · DULL & HAZY · DULL & LT OVERCAST · DARK HVY OVERCAST · VARIABLE LT & DARK

POSITION OF SUN

TIME

TEMP: COLD · COOL · WARM · HOT

MIRAGE: NONE · LIGHT · MED · HEAVY · VARIABLE

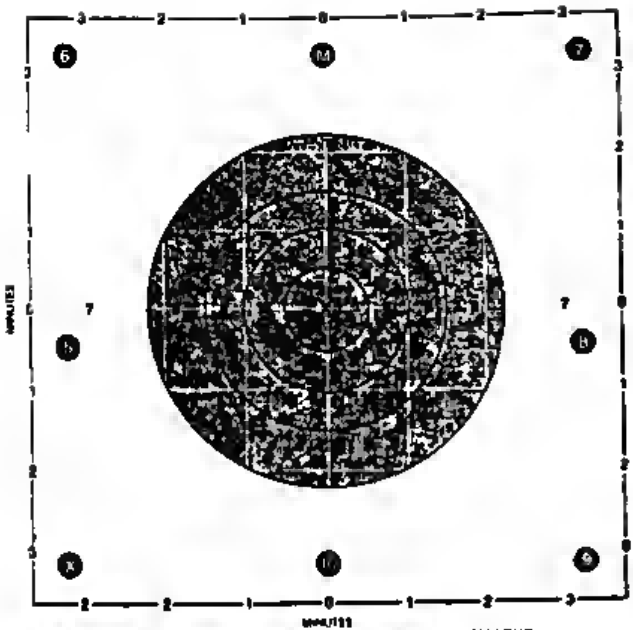
FIRING DIRECTION: EAST · WEST · NORTH · SOUTH

AMMO DATA

RIFLE ZERO	DOPE USED	CORRECT ZERO
EL / WIND	EL / WIND	EL / WIND

REMARKS

1000 YARD SLOW FIRE - PRONE



RIFLE ZERO	DOPE USED	CORRECT ZERO
EL / WIND	EL / WIND	EL / WIND

REMARKS

	CALL	EL	WD		CALL	EL	WD
20				20			
19				19			
18				18			
17				17			
1				11			
2				12			
3				13			
4				14			
5				15			
6				16			
7				17			
8				18			
9				19			
10				W			

HEAD SCORE FROM PLOT

1ST STRING	2ND STRING
— X	— X

TOTAL SCORE

— X

RIFLE NO

DATE

PLACE

RING | TGT | RELAY

WIND: NO WIND; STEADY; GUSTY; FISHTAIL

LIGHT: BRIGHT & CLEAR; DULL & HAZY; DULL & LT OVERCAST; DARK-HVY OVERCAST; VARIABLE LT & DARK

POSITION OF SUN

TIME

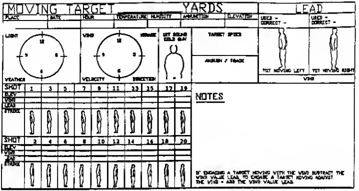
MIRAGE: NONE; LIGHT; MED; HEAVY; VARIABLE

TEMP: COLD; COOL; WARM; HOT

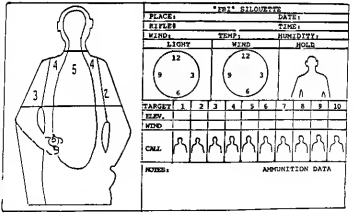
FIRING DIRECTION

EAST	WEST
NORTH	SOUTH

AMMO DATA

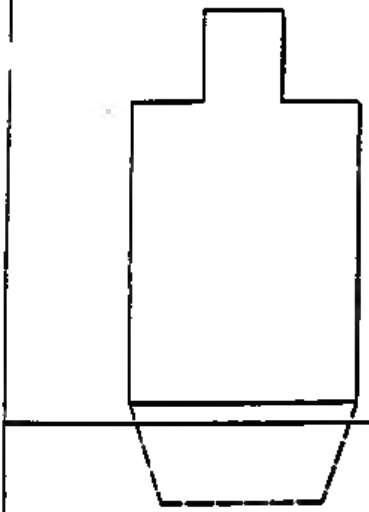


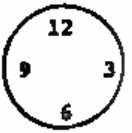
MOVING TARGET YARDS
LEAD
PLACE
DATE
HOUR
TEMPERATURE
HUMIDITY
AMMUNITION
ELEVATION
USED -
CORRECT -
USED -
CORRECT -
LIGHT
12
9
3
6
WEATHER
WIND
MIRAGE
12
9
3
6
VELOCITY
DIRECTION
1ST ROUND COLD GUN
TARGET SPEED
TGT MOVING LEFT
TGT MOVING RIGHT
WIND
SHOT 1 3 5 7 9 11 23 15 17 19
ELEV
WIND
LEAD
STRIKE
SHOT 2 4 6 8 10 12 14 16 18 20
ELEV
WIND
LEAD
STRIKE
NOTES
IF ENGAGING A TARGET MOVING WITH THE WIND SUBTRACT THE WIND VALUE LEAD. TO ENGAGE A TARGET MOVING AGAINST THE WIND - ADD THE WIND VALUE LEAD.



4
5
4
3
2
"FBI" SILOUETTE
PLACE:
DATE:
RIFLE:
TIME:
WIND:
TEMP:
HUMIDITY:
LIGHT
WIND
HOLD
12
9
3
6
12
9
3
6
TARGET 1 2 3 4 5 6 7 8 9 10
ELEV.
WIND
CALL
NOTES:
AMMUNITION DATA

FULL SILHOUETTES



PLACE								DATE			
RIFLE #			AMMO					HOUR			
WIND			TEMP					HUMIDITY			
LIGHT			WIND					HOLD			
											
TARGET	1	2	3	4	5	6	7	8	9	10	
ELEV											
WIND											
CALL											

NOTES

1st ROUND, COLD BORE SHOT

EL:	WIND:	EL:	WIND:	EL:	WIND:	EL:	WIND:
							
RANGE:		RANGE:		RANGE:		RANGE:	
DATE:		DATE:		DATE:		DATE:	
TEMP:		TEMP:		TEMP:		TEMP:	
AMMO:		AMMO:		AMMO:		AMMO:	
CONDITIONS:		CONDITIONS:		CONDITIONS:		CONDITIONS:	

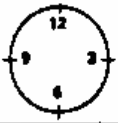
MOVING TARGET

_____ YARD LINE

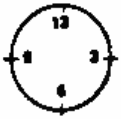
RANGE	RIFLE AND SCOPE NO	DATE/HOUR	MILS HT	MILS HT

AMMO	MIRAGE	TEMP	TGT SPEED	REMARKS

LIGHT



MPH WIND



TGTS	1	2	3	4	5	6	7	8	9	10
ELEV										
WIND										
MILS										
CALL										

ELEV	WIND	ELEV	WIND

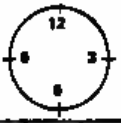
MOVING TARGET

_____ YARD LINE

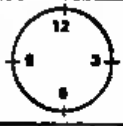
RANGE	RIFLE AND SCOPE NO	DATE/HOUR	MILS HT.	MILS HT.

AMMO	MIRAGE	TEMP	TGT SPEED	REMARKS

LIGHT



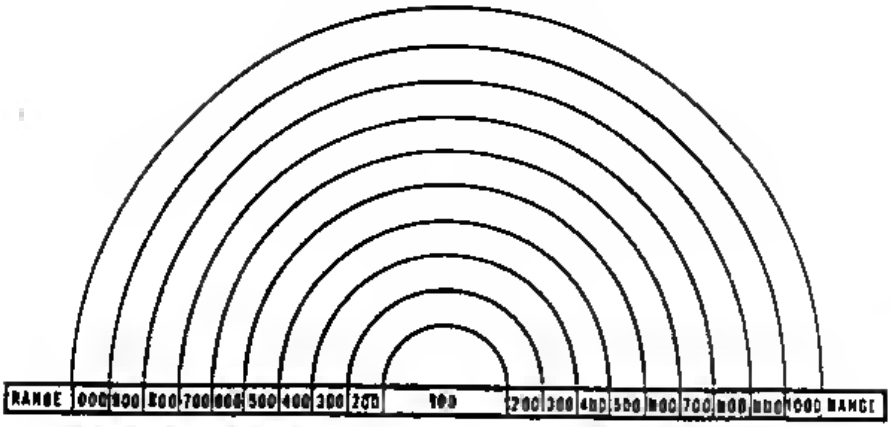
MPH WIND



TGTS	1	2	3	4	5	6	7	8	9	10
ELEV										
WIND										
MILS										
CALL										

ELEV	WIND	ELEV	WIND

SNIPERS RANGE CARD



GRID COORDINATE OF POSITION _____

METHOD OF OBTAINING RANGE _____

MADE OUT BY _____

DATE _____

OBSERVATION LOG

SHEET ____ of ____ SHEETS

ORIGINATOR		DATE	TOUR OF DUTY	POSITION	VISIBILITY

SERIAL	TIME	GRID COORDINATE GR/BRG AND RANGE	EVENT	ACTION OR REMARKS

SNIPER'S RECORD

DATE	TYPE OF ROUNDS	NO. RDS. FIRED	TOTAL	DATE	TYPE OF ROUNDS	NO. RDS FIRED	TOTAL

REMARKS

TOTAL THIS PAGE	
TOTAL FROM PREVIOUS PAGES	
CUMULATIVE TOTAL	

SNIPER'S DATA CARD

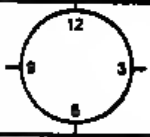
For use of this form, see TC 23-14; the proponent agency is TRADOC

DISTANCE TO TARGET_____ METERS

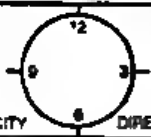
RANGE	RIFLE AND SCOPE NO	DATE	ELEVATION		WINDAGE	
			USED	CORRECT	USED	CORRECT

AMMO	LIGHT	MIRAGE	TEMP	HOUR	HOLD

LIGHT



WIND



VELOCITY DIRECTION

SHOT	1	2	3	4	5	6	7	8	9	10	REMARKS
ELEV											
WIND											
CALL											

NOTE: THE REQUIRED TARGETS WILL BE DRAWN IN BY HAND TO MEET THE NEEDS OF THE UNIT

DA FORM 5795-R, JUN 85

SNIPER'S OBSERVATION LOG

For use of this form, see TC 23-14; the proponent agency is TRADOC

SHEET____ OF____ SHEETS

ORIGINATOR.	DATE/TIME.	LOCATION

SERIAL	TIME	GRID COORDINATE	EVENT	ACTIONS OR REMARKS

DA FORM 5756-R, JUN 89

Appendix L

SNIPER TEAM DEBRIEFING FORMAT

PREPARATION FOR DEBRIEFING

After the mission, the SEO or S3 representative directs the sniper team to an area where it prepares for a debriefing. The team remains in the area until called to the operations center.

A. The sniper team will:

(1) Lay out and account for all team and individual equipment.

(2) Consolidate all captured material and equipment.

(3) Review and discuss the events listed in the mission logbook from insertion to return, including details of each enemy sighting.

(4) Prepare an overlay of the team's route, area of operations, insertion point, extraction point, and significant sighting locations.

B. An S3 representative controls the debriefing. He directs the team leader:

(1) To discuss any enemy sightings since the last communications with the radio base station.

(2) To give a step-by-step account of each event listed in the mission logbook from insertion until reentry of the FLL, including the details of all enemy sightings.

(3) To complete a debriefing form (Table 5-2) and to draw an overlay as discussed.

The team leader either completes the form or has the observer complete different sections. He then returns the form and overlay to the S3 representative, while the observer performs post-mission maintenance tasks.

C. When the debriefing is complete, the S3 representative releases the sniper team back to its parent unit.

SNIPER TEAM DEBRIEFING FORMAT

MISSION REPORT

TEAM NUMBER _____ DATE-TIME-GROUP _____

TO _____

MAPS USED: 1:25,000: _____
1:50,000: _____
1:250,000: _____
SPECIAL: _____

A. SIZE AND COMPOSITION OF TEAM:

TEAM LEADER: _____
OBSERVER: _____

B. MISSION: _____

C. ESSENTIAL ELEMENTS OF INFORMATION (USE ATTACHED SHEET):

D. OTHER INTELLIGENCE REQUIREMENTS (USE ATTACHED SHEET):

E. TIME OF DEPARTURE (DATE-TIME-GROUP):-

METHOD OF INSERTION: _____

POINT OF DEPARTURE (SIX-DIGIT GRID COORDINATES):

_____

F. ENEMY SPOTTING EN ROUTE (USE ATTACHED SHEET, IF NEEDED):

1. GROUND ACTIVITY: _____
2. AIR ACTIVITY: _____
3. MISCELLANEOUS ACTIVITY: _____

G. ROUTES (OUT) (PROVIDE OVERLAY):

1. DISMOUNTED BY FOOT: _____
2. BY VEHICLE (STATE TYPE): _____
3. BY AIRCRAFT (STATE TYPE): _____

H. TERRAIN (USE ATTACHED SHEET IN THE FOLLOWING FORMAT):

KEY TERRAIN
SIGNIFICANT TERRAIN
DECISIVE TERRAIN
AVENUES OF APPROACH (STATE SIZE)
TERRAIN COMPARTMENT
TERRAIN CORRIDOR
MAP CORRECTIONS

I. ENEMY FORCES AND INSTALLATIONS (USE ATTACHED SHEET):

J. MISCELLANEOUS INFORMATION (USE ATTACHED SHEET, IF NECESSARY):

1. LACK OF ANIMALS OR STRANGE ANIMAL BEHAVIOR: _____

2. MUTILATED PLANTS: _____
3. UNCOMMON INSECTS: _____
4. ABANDONED MILITARY EQUIPMENT (CHECK FOR AND INCLUDE NUMBER AND TYPE):
   A. OUT OF FUEL: _____
   B. UNSERVICEABLE (ESTIMATE WHY): _____
   C. DESTROYED OR DAMAGED ON PURPOSE BY ENEMY FORCES: _____
   D. OPERATIONAL EQUIPMENT LEFT INTACT: _____

5. ABANDONED TOWNS/VILLAGES: _____

K. RESULTS OF ENCOUNTERS WITH ENEMY FORCE AND LOCAL POPULACE: _____

L. CONDITION OF TEAM, INCLUDING DISPOSITION OF DEAD AND WOUNDED: _____

M. ALL MAPS RETURNED OR ANT OTHER IDENTIFIABLE MATERIEL RETURNED WITH TEAN: YES; NO; WHAT IS MISSING?; STATE ITEM AND WHERE APPROXIMATELY LOST: _____

N. CONCLUSIONS AND RECOMMENDATIONS: _____

O. CAPTURED ENEMY EQUIPMENT AND MATERIEL: _____

P. TIME OF EXTRACTION (DATE-TIME-GROUP): _____

METHOD OF EXTRACTION: _____

EXTRACTION POINT (SIX-DIGIT GRID COORDINATES): _____

Q. ROUTES (BACK) (PROVIDE OVERLAY):

1. DISMOUNTED BY GROUND (E&E): _____
2. FLIGHT ROUTE BACK: _____

R. ENEMY SPOTTING EN ROUTE TO BASE (USE ATTACHED SHEET, IF NEEDED):

1. GROUND ACTIVITY: _____
2. AIR ACTIVITY: _____

3. MISCELLANEOUS ACTIVITY: _____

S TIME OF RETURN (DTG): _____

POINT OF RETURN (SIX-DIGIT GRID COORDINATES): _____

TEAM LEADER: _____ _____
(PRINT NAME) (GRADE)

_____ _____
(UNIT) (SIGNATURE)

ADDITIONAL REMARKS BY INTERROGATOR/DEBRIEFER: _____

Appendix M

MISSION PACKING LIST

The sniper team determines the type and quantity of equipment it carries by a METT-T analysis. Some of the equipment mentioned may not be available. A sniper team, due to its unique mission requirements, carries only mission-essential equipment.

ARMS AND AMMUNITION

Sniper:

- M24 sniper weapon system (SWS) with M3A telescope.
- 100 rounds M118/M852 ammunition.
- Sniper's data book, mission logbook, range cards, wind tables, and slope dope.
- M9/Service pistol.
- 45 rounds 9-mm ball ammunition.
- 3 each 9-mm magazines.
- M9 bayonet.
- 4 M67 fragmentation grenades.
- 2 CS grenades; 2 percussion grenades (MOUT).
- M18A1 mine, complete.

Observer:

- M21 SWS/LSR/M-16A2/M203 (w/NVD as appropriate).
- 200-210 rounds ammunition.
- 5 to 7 magazines for rifle -- 5(M21) or 7(M16A2).
- M9 9-mm pistol.
- 45 rounds 9-mm ball ammunition.
- 3 each 9-mm magazines.
- M9 bayonet.
- 6 rounds 40mm high-explosive ammunition.

- 3 rounds 40mm antipersonnal ammunition.
- 4 M67 fragmentation grenades; 2 CS grenades; 2 percussion (MOUT).

SPECIAL EQUIPMENT

Sniper:

- M24 SWS cleaning kit.
- M24 SWS deployment kit (tools and replacement parts).
- M9 pistol cleaning kit.
- Extra handset for radio.
- Extra batteries for radio (BA 4386 or lithium, dependent on mission length).
- SOI.
- AN/PVS-5/7 series, night vision goggles.
- Extra BA-1567/U or AA batteries for night vision goggles.
- Face cord.
- E-tool with carrier.
- 50-foot 550 cord.
- 1 green and 1 red star cluster.
- 2 HC smoke grenades.
- Measuring tape (25-foot carpenter-type).

Observer:

- M16A1/A2 cleaning kit.
- M203 cleaning kit.
- AN/PRC-77/AM-PRC-119/AN/PRC-104 radio.
- Radio accessory bag, complete with long whip and base, tape antenna and base, handset, and battery (BA-4386 or lithium).
- M49 20x spotting scope with M15 tripod (or equivalent 15

to 20x fixed power scope, or 15-45x spotting scope)

- M19/M22 binoculars (preferably 7 x 50 power with mil scale)
- Range estimation "cheat book".
- 300-feet WD-1 field wire (for field-expedient antenna fabrication).
- Olive-drab duct tape olive-drab ("100 mph") tape.
- Extra batteries for radio (if needed).
- Extra batteries (BA-1576/U) for AN/PVS-4.
- Calculator with extra battery.
- Butt pack.
- 10 each sandwich-size waterproof bags.
- 2 HC smoke grenades.
- Linesman's tool.

UNIFORMS AND EQUIPMENT

- Footgear (jungle/desert/cold weather/combat boots).
- 2 sets BDUs (desert/woodland/camouflage).
- Black leather gloves
- 2 brown T-shirts.
- 2 brown underwear.
- 8 pair olive-drab wool socks.
- Black belt.
- Headgear (BDU/jungle/desert/cold weather).
- ID tags and ID card.
- Wristwatch (sweep second hand with luminous dial/waterproof).
- Pocket survival knife.

- Large ALICE pack, complete with frame and shoulder straps.
- 2 waterproof bags (for ALICE pack).
- 2 2-quart canteens with covers.
- 1 bottle water purification tablets.
- LBE complete.
- Red-lens flashlight (angle-head type with extra batteries).
- MREs (number dependent on mission length).
- 9-mm pistol holster and magazine pouch (attached to LBE).
- 2 camouflage sticks (METT-T dependent).
- 2 black ink pens.
- 2 mechanical pencils with lead.
- 2 black grease pencils.
- Lensatic compass.
- Map(s) of operational area and protractor.
- Poncho.
- Poncho liner.
- 1 each ghillie suit complete.
- 1 each protective mask/MOPP suit.
- Foot powder.
- Toiletries.

OPTIONAL EQUIPMENT

- M203 vest.
- Desert camouflage netting.
- Natural-colored burlap.
- Glitter tape.

- VS-17 panel.
- Strobe light with filters.
- Special patrol insertion/extraction system harness.
- 12-foot sling rope.
- 2 each snap links.
- 120-foot nylon rope.
- Lip/sun screen.
- Signal mirror.
- Pen gun with flares.
- Chemical lights (to include infrared).
- Body armor/flak jacket.
- Sniper veil.
- Sewing kit.
- Insect repellant.
- Sleeping bag.
- Knee and elbow pads.
- Survival kit.
- Rifle drag bag.
- Pistol silencer/suppressor.
- 2.5-pounds C4 with caps, cord, fuse, and igniter.
- Rifle bipod/tripod.
- Empty sandbags.
- Hearing protection (ear muffs).
- Thermometer.
- Laser range finder.
- Thermal imager.

- KN-200-KN-250 imaga intensifiar.
- Pocket binoculara.
- 35-mm automatic loading camera with appropriate lenses and film.
- 1/2-inch camcorder with accesaoriaa.
- Satellite communicstion equipment.
- Short-rsnga radio with aarphone snd whisper microphone.
- Field-expedient sntennsa.
- Information reporting formats.
- Encryption davica for rsdio.
- SO snipar trsining/employment manual

SPECIAL TOOLS AND EQUIPMENT (MOUT)

- Pry bar.
- Plisrs.
- Screwdrivsr.
- Rubbar-headad hammer.
- Glaas cuttsr.
- Masonry drill and bits.
- Metsl shssrs.
- Chiaal.
- Auger.
- Lock pick, skeleton keys, cobra pick.
- Bolt cutters.
- Hsckaaw or bandssw.
- Sledgshammer.
- Axe.

- Rem.
- Power eew.
- Cutting torch.
- Shotgun.
- Spraypaint.
- Stethoacope.
- Mape/etreet plene.
- Photographa, aarial and penoramic.
- Whiatle.
- Luminoua tape.
- Flex cuffe.
- Pedlocke.
- Inetruaioo detection eyetem (booby trepe).
- Portable epotlight(e).
- Money (US end indigenoue).
- Civilian ettire.

ADDITIONAL EQUIPMENT TRANSPORT

Tha plennad uee of air end vehicle drope end ceching tachniquee elimineted the need for the eniper taam to cerry axtra aquipment. Anothar method ie to use tha etay-behind tachnique when opereting with e eecurity petrol. (See Chaptar 5). Through coordination with the eecurity petrol leadar, tha teem'a aquipmant may ba broken down emong the petrol mambera. Oo arrival et the ORP, the eecurity petrol may laava behind ell miaaion-eseential equipment. After completiog the miseion, tha taam may ceche tha equipmant for letar pickup, or it may be raturned the eama way it wae brought in.

Appendix N

REPRODUCIBLE FORMS

Concealed Movement Exercise

For use of this form, see FM 23-10. The proponent agency is TRADOC.

DATA REQUIRED BY PRIVACY ACT OF 1974.
AUTHORITY: 10 USC 3012(g)/Executive Order 9397. PRINCIPAL PURPOSE(S): Evaluates individual training. ROUTINE USE(S): Evaluates individual proficiency. SSN is used for positive identification purposes only. MANDATORY OR VOLUNTARY DISCLOSURE AND EFFECT ON INDIVIDUAL NOT PROVIDING INFORMATION: Voluntary. Individuals not providing information cannot be rated/scored on a mass basis.

EXERCISE NUMBER: _____ DATE: _____
LAST NAME FIRST MI RANK SSN UNIT

_____ _____ _____ _____ _____ _____

CONCEALED MOVEMENT EXERCISE AREA: _____
WEATHER/VISIBILITY: _____ SCORE: _____

_____ _____
TRAINER'S SIGNATURE SNIPER'S SIGNATURE

If the sniper	Points
Was detected moving to the FFP	2
Was detected moving in the FFP	3
Fired first shot, not detected	4
Was not detected when assistant trainer is within 10 feet of firer	5
Properly identified number (within 30 seconds)	6
Failed to properly identify number	3
Was not detected when assistant trainer is within 5 feet of firer	7
Fired second shot, not detected	8
Maintained stable firing position (support)	9
Properly adjusted weapon's scope for range and windage	10

NOTE: 1. If muzzle blast/flash is detected, deduct 1 point from the total score.

2. Feiling to comply with trsining stsndsrde end objectives (such ss unneceeeary movement, premature fire, outside of preecribe boundaries) will result in termioetion of the exerciee end s ecore of zero.

(Check one of the target indicstore).

IMPROPER MOVEMENT TECHNIQUES _____
IMPROPER CAMOUFLAGE _____
SHINE _____
OUTLINE _____
CONTRAST TO BACKGROUND _____
SOUND _____
MUZZLE BLAST _____
MUZZLE FLASH _____

REMARKS: (EXPLAIN IN DETAIL THE REASONS FOR THE SMIPER'S DETECTION>)

_____
_____
_____

Target Detection Exercise

For uee of this form, eee FM 23-10. The proponent agency is TRADOC.

DATA REQUIRED BY PRIVACY ACT OF 1974.

AUTHORITY: 10 USC 3012(g)/Executive Order 9397. PRINCIPAL PURPOSE(S): Eveluetes individusl trsining. ROUTINE USE(S): Evalustss individuel proficiency. SSN is used for positive idsntificetion purpoeee only. MANDATORY OR VOLUNTARY DISCLOSURE AND EFFECT ON INDIVIDUAL NOT PROVIDING INFORMATION: Voluntery. Individuele not providing information cennot be rated/scored on e maee bssie.

EXERCISE AREA/NUMBER: _____ DATE: _____

LAST NAME _____ FIRST _____ MI _____ RANK _____ SSN _____ UNIT _____

WEATHER/VISIBILITY: _____ SCORE: _____

TRAINER'S SIGNATURE _____ SNIPER'S SIGNATURE _____

NO.	SIZE	DESCRIPTION SHAPE	COLOR	COND	APPEARS TO BE	LOCATION	POSITION (Circle one-A-B
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							

Range Estimation Exercise

For use of this form, see FM 23-10. The proponent agency is TRADOC.

DATA REQUIRED BY PRIVACY ACT OF 1974.

AUTHORITY: 10 USC 3012(g)/Executive Order 9397. PRINCIPAL PURPOSE(S): Evaluates individual training. ROUTINE USE(S): Evaluates individual proficiency. SSN is used for positive identification purposes only. MDNATORY OR VOLUNTARY DISCLOSURE AND EFFECT ON INDIVIDUAL NOT PROVIDING INFORMATION: Voluntary. Individuals not providing information cannot be rated/scored on a mass basis.

EXERCISE NUMBER: _____ DATE: _____

LAST NAME _____ FIRST _____ MI _____ RANK _____ SSN _____ UNIT _____

EXERCISE AREA: _____

WEATHER/VISIBILITY: _____ SCORE : _____

TRAINER'S SIGNATURE _____ SNIPER'S SIGNATURE _____

	EYE ESTIMATION	BINOCULAR ESTIMATION	M3A TELESCOPE ESTIMATION
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

1. Within three minutes, estimate the range to the target at each point, using the naked eye, binoculars, and M3A telescope. Estimations are performed in the order listed.
2. Do not change eye or binocular estimates after recording, or these estimates will be counted as incorrect answers. However, the M3A telescope estimate may be changed before making the next set of estimates.
3. The use of calculators is encouraged.
4. This is an individual exercise. Any sniper that talks or tries to look at another sniper's scorecard will be terminated from the exercise.
5. To ask a question, raise your hand, and the trainer will assist you.

Qualification Table No. 1

For use of this form, see FM 23-10. The proponent agency is TRADOC.

DATA REQUIRED BY PRIVACY ACT OF 1974.
AUTHORITY: 10 USC 3012(G)/Executive Order 9397. PRINCIPAL PURPOSE(S): Evaluates individual training. ROUTINE USE(S): Evaluates individual proficiency. SSN is used for positive identification purposes only. MANDATORY OR VOLUNTARY DISCLOSURE AND EFFECT ON INDIVIDUAL NOT PROVIDING INFORMATION: Voluntary. Individuals not providing information cannot be rated/scored on a mass basis.

RECORD OR PRACTICE
(circle one)

EXERCISE NUMBER: _____ DATE: _____

LAST NAME _____ FIRST _____ MI _____ RANK _____ SSN _____ UNIT _____

EXERCISE AREA: _____

WEATHER/VISIBILITY: _____ SCORE: _____

TRAINER'S SIGNATURE _____ SNIPER'S SIGNATURE _____

TARGET (meters)	1st Round	2nd Round	Miss
200			
300			
325			
375			
500			
600			
500			
375			
600			
700			
500			
400			
325			
400			
600			
500			
700			
325			
300			
200			
	x 10 =	x 5 =	

Qualification Table No. 2

For use of this form, see FM 23-10. The proponent agency is TRADOC.

DATA REQUIRED BY PRIVACY ACT OF 1974.

AUTHORITY: 10 USC 3012(g)/Executive Order 9397. PRINCIPAL PURPOSE(S): Evaluates individual training. ROUTINE USE(S): Evaluates individual proficiency. SSN is used for positive identification purposes only. MANDATORY OR VOLUNTARY DISCLOSURE AND EFFECT ON INDIVIDUAL NOT PROVIDING INFORMATION: Voluntary. Individuals not providing information cannot be rated/scored on a mass basis.

RECORD OR PRACTICE
(circle one)

EXERCISE NUMBER: _____ DATE: _____

LAST NAME _____ FIRST _____ MI _____ RANK _____ SSN _____ UNIT _____

EXERCISE AREA: _____

WEATHER/VISIBLITY: _____ SCORE: _____

TRAINER'S SIGNATURE _____ SNIPER'S SIGNATURE _____

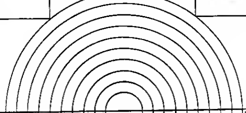
TARGET (meters)	1st Round	2nd Round	Miss
300			
325			
375			
600			
500			
600			
700			
750			
800			
850			
900			
850			
800			
750			
700			
900			
500			
400			
325			
300			
	x 10 = _____	x 5 = _____	_____

SNIPER'S RANGE CARD

For use of this form, see TC 23-14, the proponent agency is TRADOC

NAME

METHOD OF OBTAINING RANGE



RANGE													RANGE
ELEVATION													ELEVATION
WINDAGE													WINDAGE

TEMPERATURE		WIND		TRP 1		TRP 2		TRP 3	
HIGH	LOW	VELOCITY	DIRECTION	AZIMUTH	DISTANCE	AZIMUTH	DISTANCE	AZIMUTH	DISTANCE
				DESCRIPTION		DESCRIPTION		DESCRIPTION	

DA FORM 5787-R, JUN 89

MILITARY SKETCH

For use of this form, see TC 23-14, the proponent agency is TRADOC

REMARKS		REMARKS

SKETCH NAME ______ GRID COORDINATE ______ WEATHER ______	↑ = MAGNETIC AZIMUTH	SKETCH # ______ OF ______ SCALE ______	NAME RANK DATE/TIME

DA FORM 5788-R, JUN 89

Appendix U

GLOSSARY

O-1. ACRONYMS AND ABBREVIATIONS

AAR	aftar action raview/raport
AMU	Army Markamanahip Unit
AP	anti-peraonnel or armor piercing
AR	Army Ragulation
ARM	advancad rifla markamaoahip
ART	adjuatable ranging talaacope
ARTEP	Army Training and Evaluation Program
ATB	appeara to be
BMNT	beginning morniog nautical twilight
BRM	baaic rifla markamanahip
BTB	blind tranamiaaion broadcaat
C	cantigrada
C2	command and control
C3	command, control, and communicationa
C3I	command, control, communicationa, and intelligance
CA	oivil affaira
CARVER	oriticality, accaaaibility, recuperebility, vulnerebility, affect, recognizebility (target enelyaia)
CAS	cloaa air aupport
CLP	claanar, lubricant, preaervative
cm	centimater
CMO	civil-military operationa
CN	countar-narcotica
COMSEC	communicationa aacurity
CSAR	combat aaaroh aod reacua
CT	countarterroriam
DA	Depertment of the Army or direct action
DOD	Dapertment of Defanaa
DODAC	DOD ammunition code
DTG	date-time group
E&E	aacape and avaaion
EEI	eaaential alementa of information
EENT	anding evening nautical twilight
EW	alactronic warfare
F	Fahrenheit
FC	field circular
FFL	final firing line
FFP	final firing position
FID	foraign internal defenae
FLOT	forward line of troopa
FM	field manual
fpa	faat par aecond
FRAGO	fragmentary order
FSN	Federal Stock Numbar

FTX	field training exercise
GSR	ground surveillance radar
GTA	graphic training aid
HN	host nation
HUMINT	human intelligence
HVT	high value target
Hz	hertz
IAD	immediate action drills
IAW	in accordance with
IDAD	internal defense and development
INTSUM	intelligence summary
KD	known distance
kg	kilogram
KIM	keep-in-memory (exercise game)
km	kilometer
IPB	intelligence preparation of the battlefield
IR	intelligence requirements
JSOA	joint special operations area
LFX	live fire exercise
LIC	low intensity conflict
LOC	lines of communication
LP	listening post
m	meter
METL	mission essential task list
METT-T	mission, enemy, terrain, troops, and time available
MHz	megahertz
MIJI	meaconing, intrusion, jamming, and interference
MILES	multiple integrated laser engagement system
mm	millimeter
MMPI	Minnesota Multi-Phasic Personality Inventory
MOA	minute of angle (1.0472" at 100 yards)
MOPP	mission oriented protective posture
MOUT	military operations on urbanized terrain
mph	miles per hour
MTOE	modification table of organization and equipment
MTP	mission training plan
MTT	mobile training team
NATO	North Atlantic Treaty Organization
NBC	nuclear, biological, chemical
NCA	National Command Authority
NSN	national stock number
NVD	night vision device
OP	observation post
OPORD	operation order
OPSEC	operational security
PIR	priority intelligence requirement
POC	point of contact
POI	program of instruction
POL	petroleum, oils, and lubricants
PRI	preliminary rifle instruction
PSYOP	psychological operations
RETS	remote electronic target system

ROE	rulea of engagement
RTO	radiotelephone operator
SALUTE	size, activity, location, unit, time, and equipment
SAR	search and reacue
SEO	aniper employment officer
SITREP	aituation report
SO	spacial operations
SOF	special operations forces
SOI	aignal operation instructions
SOP	standing operating procedure
SOTIC	Special Operations Target Interdiction Course
SR	apecial reconnaisaance
SRT	apecial raaction team
ST	special text
STANAG	NATO Standardization Agreement
STANO	aurveillance, target acquisition, and night observation
STP	aoldier'a training publication
SWS	aniper weapon aystem
TB	technical bullatin
TC	training circular
T&EO	training and avaluation outlina
TFFP	tantativa final firing poaition
TIP	targat intalligaanca packaga
TM	tachnical manual
TOE	tabla of organization and aquipmant
TRP	targat rafaranca point
UBL	unit baaic load
USAMU	US Army Markamanahip Unit
UW	unconvantional warfara

O-2. DEFINITIONS

Accuracy: In sniping, tha ability of tha anipar and hia waapon to deliver praciaion fire on a daaired target. Accuracy can aaily be meaaurad as the ability to group all shots cloae to a daaired impact point. The deviation from the daaired impact point or the aize of the group is a function of range. Accuracy ia tha product of uniformity.

Action: The machaniam of a aniper rifle or other firaarm that normally performs loading, feeding, locking, firing, unlocking, extracting, and ejection. Also known as the raceiver or frame.

Adjustabla objactiva: Fine focuaing ring on tha objactive lana of a telaacope that halpa to eliminate parallax.

Adjuatad aiming point: An aiming point that allowa for gravity, wind, target movemant, zero changaa, or NOPP firing.

Ammunition lot: A quantity of cartridges made by one manufacturer under uniform conditions from the same materials. Ammunition within a lot is expected to perform in a uniform manner.

Ammunition lot number: Code number that identifies a particular quantity of ammunition from one manufacturer. It is usually printed on the ammunition case, and the individual boxes in which the ammunition comes.

Ball ammunition: General-purpose standard service ammunition with a solid core (usually of lead) bullet.

Ballistic coefficient: A number used to measure how easily a bullet slips through the air (aerodynamic efficiency). Most bullets have BCs between .100 and .700. Higher BCs are required for long-range shooting.

Ballistics: A science that deals with the motion and flight characteristics of projectiles.

Base: The sniper's operational area, where established control measures (boundaries, limits, etc.) define his territory.

Berdan primer: Form of primer that does not have an integral anvil. Still found in Europe, it is reloaded with difficulty.

Boattail bullet: A bullet with a tapered base to reduce aerodynamic drag. Drag partly comes from the effects of cavitation (turbulence), and the progressive reduction of the diameter toward the rear of the bullet allows the air to fill in the void.

Boxer primer: Standard primer with an integral anvil.

Brass: Empty cartridge case.

Breech: The chamber end of the barrel.

Bullet drop: The amount that a bullet falls due to the effect of gravity.

Bullet drop compensator: Any device that is integral to the rifle telescope that is designed to compensate for the bullet's trajectory.

Caliber: The measurement taken within the barrel from groove to groove or from the outside diameter of the bullet.

Chamber: Part of the bore, at the breech, formed to accept and support the cartridge.

Chronograph: An instrument used to measure the velocity of a projectile.

Clandestine operation: An activity to accomplish intelligence gathering, counterintelligence, or other similar activities sponsored or conducted by governmental departments or agencies, in such a way as to ensure secrecy or concealment of the operation. It differs from covert operations in that the emphasis is placed on the concealment of the operation, rather than on the concealment of the sponsor's identity.

Cold-bore shot: The first shot from a clean, unfired weapon.

Collimator: Bore-sighting device.

Concealment: Protection from view. This is not necessarily the same as cover. Cover provides concealment, but concealment does not always provide cover.

Cover: Protection form hostile gunfire. Cover is a relative term. Cover that is thick enough to stop pistol bullets may not be adequate protection against rifle bullets. This is a crucial fact to keep in mind when selecting cover.

Covert operation: An operation that is planned and executed as to conceal the identity of, or permit plausible denial by, the sponsor(s). This differs from a clandestine operation in that emphasis is placed on the concealment of the sponsor's identity, rather than on the concealment of the operation.

Crimp: The bending inward of the mouth of the case in order to grip the bullet, or around the primer to seal it.

Cross dominance: A soldier with a dominant hand and a dominant eye that are not on the same side; for example, a right-handed firer with a dominant left eye.

Crown: The technique used to finish the barrel's muzzle. The rifling at the end of the barrel can be slightly relieved, or recessed. The purpose is to protect the forward edge of the rifling from damage which can ruin accuracy.

Deflection: The change in the path of the bullet due to wind or passing through a medium.

Detailed search: A systematic observation of a target area in detail, using overlapping observation in a 180 degree area, 50 meters in depth, starting in and working away from the observer.

Drag: The aerodynamic resistance to a bullet's flight.

Drift: The horizontal deviation of the projectile from its line of departure due to its rotational spin or the effects of the wind.

Drop: The distance that a projectile falls due to gravity measured from the line of departure.

Dry firing: Aiming and firing the weapon without live ammunition. This is an excellent technique to improve marksmanship skills, and does not cause any damage to a center-fire firearm. It is best done with an expended case in the chamber to cushion the firing pin's fall.

Effective wind: The average of all of the varying winds encountered.

Exit pupil: The small circle of light seen coming from the ocular lens of an optical device when held at arm's length. The exit pupil can be determined mathematically by dividing the objective lens diameter (in millimeters) by the magnification. The result will be the diameter of the exit pupil in millimeters. (example: for a 6 X 42mm telescope: 42mm divided by 6 = 7mm). The size of the exit pupil will help in determining the effectiveness of the optical device in low-light conditions. The human pupil dilates to approximately 7mm under low-light conditions, and a telescope with a 7mm exit pupil will provide the maximum light possible to the sniper's eye.

Exterior ballistics: What happens to the bullet between the time it exits the barrel and the time it arrives at the target.

Eye relief: The distance that the eye is positioned behind the ocular lens of the telescopic sight. A two to three inch distance is average. The sniper adjusts the eye relief to ensure a full field of view. This distance is also necessary to prevent the telescope from striking the sniper's face during recoil.

Follow-through: The continued mental and physical application of marksmanship fundamentals after each round has been fired.

Fouling: Build-up of copper and powder residue in the bore. These two types of fouling require different cleaning solvents for complete removal.

Free-floating barrel: A barrel that is completely free of contact with the stock. This is critical to accuracy because of barrel harmonics. As the bullet is travelling down the barrel, the barrel is vibrating like a tuning fork. Any contact with the barrel will dampen or modify these vibrations

with (usually) a negative impact on shot-group size or point of impact.

Grain: A unit of measure; 7,000 grains are equal to 1 pound. Used to describe bullet weight (ex., 173 grains) or powder charge.

Grooves: The low point of rifling within a barrel.

Group: Formed from numerous shots fired at a target using the same point of aim, for checking accuracy. For standardization, it is best to fire five-shot groups with the same aiming point. It is a statistical fact that group size will increase with the number of shots fired.

Hand load: Also called reload. Non-factory manufactured ammunition.

Hand stop: A device attached to the weapon's fore-end (modified with a metal rail) designed to prevent the supporting hand from sliding forward.

Heavy search: A very rapid check for enemy activity; primarily used as a security measure to determine immediate threats or danger to the sniper when occupying positions.

Headspace: In rifles, the distance from the shoulder of the cartridge case to the head of the case. For bottle-necked cases, the measuring point is centered on the shoulder, and is known as the datum line. For belted magnum cases, the headspace is measured from the front of the belt to the head of the case. This dimension is critical for the safety of the shooter, as well as the accuracy of the weapon system.

Hide: The term used to describe sniper positions, normally concealed from the enemy.

Holdoff: A shooting technique used to compensate for bullet trajectory by using a modified point of aim above or below the desired point of impact. Also used to describe the modified point of aim used to compensate for wind or target movement. Also known as "Kentucky windage."

Hold-over: The modified point of aim used above the target to compensate for bullet trajectory.

Hold-under: The modified point of aim used below the target to compensate for a projectile on its upward axis of its trajectory. This is also used when shooting at angles (slopes).

Hollow-point: Describes a bullet with a hollow cavity in the tip. The Sierra Matchking bullets have this design feature to

improve accuracy, not for improved terminal effects. This bullet type has been approved by the JAG for combat use.

Indaring targets: The method that a sniper team employs to identify targets within its effective field of fire.

Interior Ballistics: What happens to the bullet before it leaves the muzzle of the rifle. Calculations are used to measure pressure forces inside the cartridge and barrel during firing.

Jacket: The copper covering over the lead core of a bullet.

Kentucky windage: An estimate of the modified point of aim required to compensate for wind or for target movement. Synonymous with holdoff.

Key hole: When the bullet hits the target other than point first. Usually indicated by an elliptical bullet hole. Caused by inadequate rotational stabilization of the bullet (usually due to insufficient barrel twist; the twist is "too slow"), deflection of the bullet by objects in the bullet's path, or other factors.

Lands: The high points in the rifling of a barrel. This is the part of the barrel that actually engraves the bullet, imparts the spin to the bullet, and ultimately stabilizes the bullet.

Lead: The modified point of aim in front of a moving target needed to ensure a hit. This depends on the range to, and the speed of, the target.

Loophole: Firing port. A hole cut to conceal the sniper but allow him to engage targets in his sector.

Mean radius: The average radius of shot dispersion from the center of a shot group.

Mid-range trajectory: The highest point in the bullet's flight. This occurs, technically, slightly beyond the half-way mark of the distance at which the rifle is zeroed. This is the highest vertical distance of the bullet above the line of sight.

Mil: An angular unit of measurement equal to 1/6400 of a complete revolution (there are 6400 mils in 360 degrees). The mil is used to estimate distance and size based on the mil relation formula: 1 mil equals 1 meter at 1,000 meters. There are 3.375 MOA in 1 mil.

Mil dot: Used to describe the reticle in telescopic sights (ex: the M3A) that has dots that are one mil apart.

Minuta of angla (MOA): A unit of angular measurement equal to 1/60th of a dagree. Although uaually approximatad as 1 inch per 100 yards of range, it ia actually aqual to 1.0472 inches per 100 yards of range.

Mirage: Tha haat waves or the reflection of light through layers of air of different denaitiea and temperatures. With opticol aids, mirage can be aean evan on the coldest days Mirage ia uaed to aatimata the effactive wind to be applied to the sight of the SWS.

Muzzla: Tha and of tba barral wbara the bullet laavea the barrel.

Muzzla valocity: The apeed of a projactile as it laaves the muzzle of the waapon.

Natural point of alm: Tha direction that tha body/rifle combination is oriented whila in a atable, relaxed firing position.

Natural raaplratory pauaa: The temporary caaaation of braathing after an exhalation and bafora an inhalation.

Nack: Tha portion of a cartridga caaa which holda the bullat.

Objactiva lana: Tha lana at tha front of the talaacope. It is usually largar in diametar than tha ocular lana.

Ocular lana: Tha lana at tha rear of tha talaacopa, naarast tha aniper's aya.

Parallax: Tha apparant movement of tha target in ralation to tha raticla whan tha anipar mova his aya in ralation to tha ocular lana. When tha targat's imaga is not focuaad on tha aama focal plana as the talaacope'a raticle, parallax is tha raault. Currant iaaua US Army rifla talaacopaa hava a fiald parallax adjustment that maka parallax arror an insignificant factor when proper aya ralief and stock wald are uaad.

Polnt of aim: The axact location on a targat with which tha rifla sights are aligned.

Point of impact: The polnt that a bullet atrikaa; usually considarad in ralation to the point of aim.

Powdar: Tha propallant matarial uaad in moat ammunition.

Primar: A amall explosive cap in the cantar of the haad of the cartridge caaa that la atruck by the firing pin to fire the round. It conaists of a small cup filled with a detonating

mixture that provides the flame (actually, a shock wave) that converts the propellant powder into a gas.

Primer pocket: The recess in the base of the cartridge case that accepts the primer. In military ammunition, it is usually crimped and sealed with a laquer sealant for water-proofing.

Probability of hit (PH): Refers to the chance (denoted as a percentage) that a given round will hit the target at a given range. PH values range from 0 to 1.0.

Rail: A metal track installed in the fore and of weapon to accept a hand stop or sling.

Ranging: The technique that a sniper uses to compensate for bullet trajectory by adjusting the ballistic cam of an adjustable/ranging talescope.

Recoil lug: The heavy metal protrusion beneath the front of the action designed to stabilize the action in the stock and transfer the recoil to the stock.

Reload: Hand-loaded ammunition.

Reticle: The sighting image, usually cross-hairs, in a telescopic sight.

Retina: The light-sensitive layer at the back of the eye. It consists of rod (black/white sensitive for night vision) and cone (color sensitive for day vision) cells.

Rifle cant: Any leaning of the rifle to the left or right from a vertical position during firing. This should be eliminated because of the potential for increasing misses at longer ranges.

Rifling: The spiral grooves in the bore of firearms that spin the bullet to provide it with rotational stability. This will ensure that the bullet flies true with a point-first attitude.

Rimfire: A cartridge whose priming compound is located in the rim of the cartridge case, and generally of .22 caliber. This type of ammunition is discharged by a strike of the firing pin to the rim. This ammunition is generally considered non-reloadable.

Rimless: The rim of the cartridge is the same diameter as the body of the case.

Rimmed: The rim of the cartridge is larger in diameter than the body of the cartridge case.

Rings: The metal devices used to support the scope. Usually 1" or 30mm in diameter.

Round: Refers to a complete cartridge.

Scout: An individual who is usually ahead of his parent organization to conduct surveillance on the enemy, conduct reconnaissance, and report information to his parent organization.

Service rifle: The primary rifle of a military force.

Silencer: See suppressor.

Sniper specialist: An individual trained in sniper employment (preferably sniper qualified) who advises the commander or operations officer (S3) on proper sniper employment.

Sniper team: Two snipers of equal training and ability; the foundation of sound sniper employment.

Speed of sound: 1120.22 fps at standard conditions. Projectiles travelling faster than this pass through the sound barrier twice: once as it exceeds the sound barrier (within the barrel), and once when it re-enters sub-sonic speeds. This effect causes a sonic crack that can be used to pin-point the firer.

Stalking: The sniper's art of moving unseen into a firing position, engaging his target, and then withdrawing undetected.

Stock weld: The contact of the cheek with the stock of the weapon.

Suppressor: A device designed to muffle or eliminate the sounds of the discharging of a firearm. It is usually fitted onto the muzzle, but can also be an integral assembly with the barrel. This usually works best with sub-sonic ammunition to eliminate the bullet's sonic crack as well.

Surveillance: The systematic observation of areas, places, persons, or things by visual, aural, electronic, photographic, or other means. The sniper makes extensive use of fixed and roving surveillance to acquire targets or assess target vulnerabilities.

Swivel: The attachment point for the sling to the stock.

Target indicators: Any sign that can enable an observer to detect the location of the enemy, his installations, or his equipment.

Terminal ballistics: What happens to the bullet when it comes into contact with the target. The study of the effect of a bullet's impact on the target.

Terminal velocity: The speed of the bullet upon impact with the target. This will determine the effectiveness of the bullet because of its direct contribution to energy/energy transfer.

Torque: The turning force applied to screws or bolts.

Trace: The air turbulence created by the shock wave of a bullet as it passes through the air. This air turbulence can be observed (with an optical aid) in the form of a vapor trail as the bullet travels toward the target.

Tracer: Type of ammunition that is visible at night due to its phosphorous compound in the base of the bullet.

Tracking: Engaging moving targets where the lead is established and maintained; moving with the target as the trigger is squeezed. Also used to describe the technique of following the enemy by his markings left on the terrain.

Trajectory: The flight path the bullet takes from the rifle to the target. The path of a bullet in flight.

Trapping: A technique for engaging moving targets. The aiming point is established forward of the target. The rifle is held stationary and fired as the target approaches the aiming point.

Twist: The rate of pitch of the rifling in a firearm's bore. Usually measured by the length of barrel in inches required for the bullet to make one complete revolution, and expressed as a twist rate (ex., 1 turn in 11.2 inches; 1/11.2).

Velocity: The speed of the projectile.

Windage: The distance or amount of horizontal correction that a sniper must use to hit his target due to the effects of wind or drift. The adjustment on the telescope or iron sights to compensate for horizontal deflection of the bullet.

X: The power of optical magnification (ex., 10X, 3X-9X).

Zero: The range at which the point of aim and the point of impact are one and the same.

Appendix F

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Appendix Q

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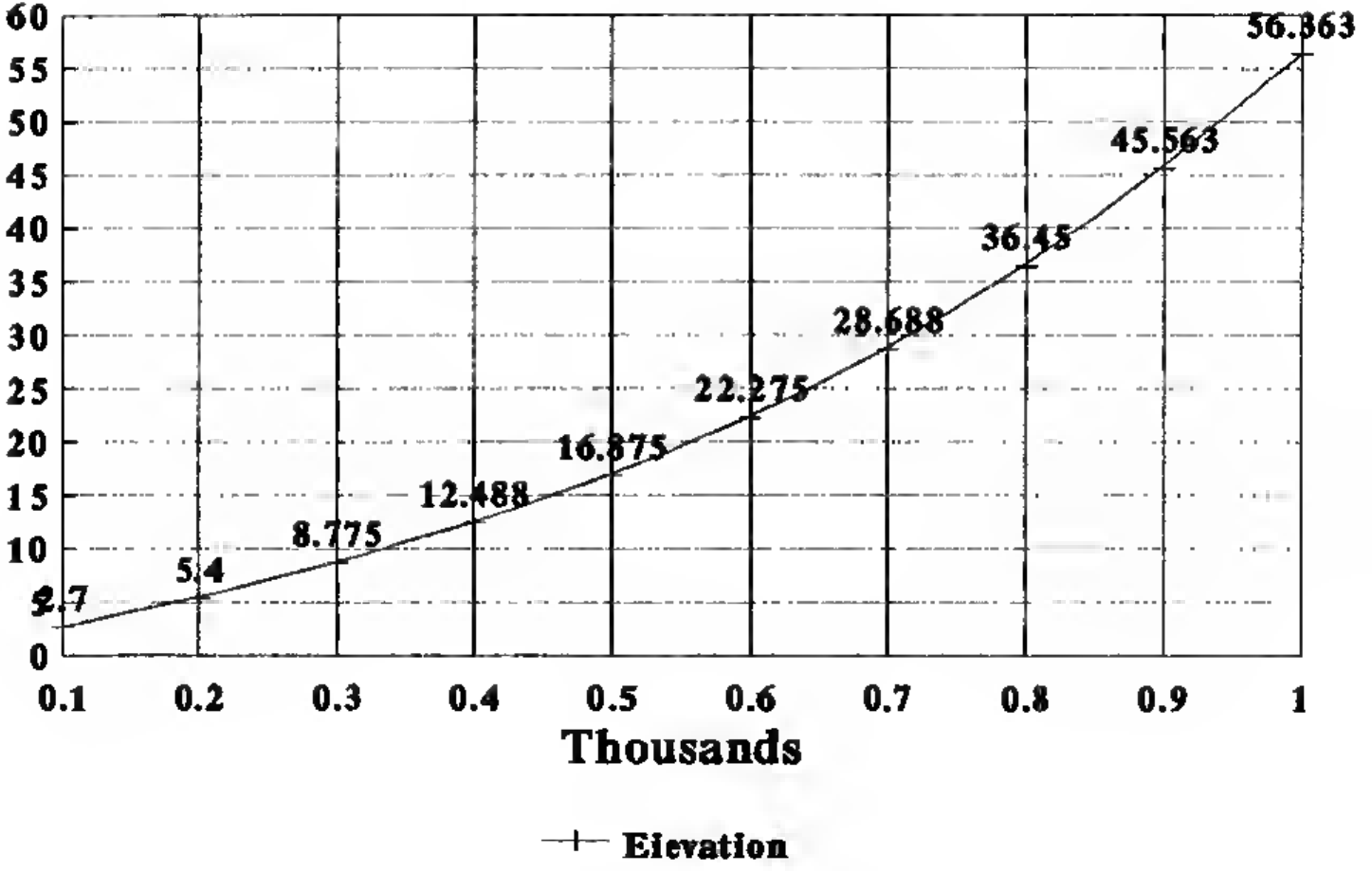
7.62

M80 Ball

147 gr
2750 fps



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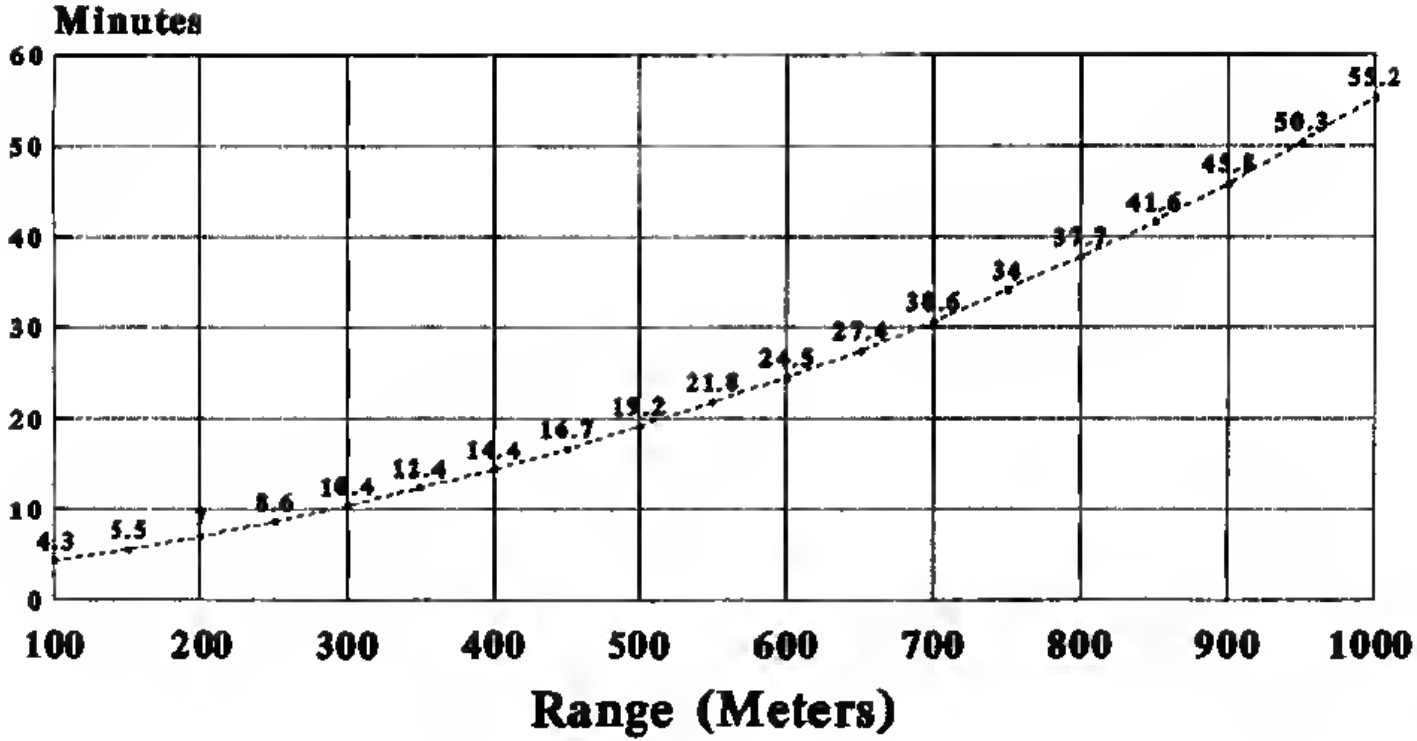
2600 fps

7.62

M852



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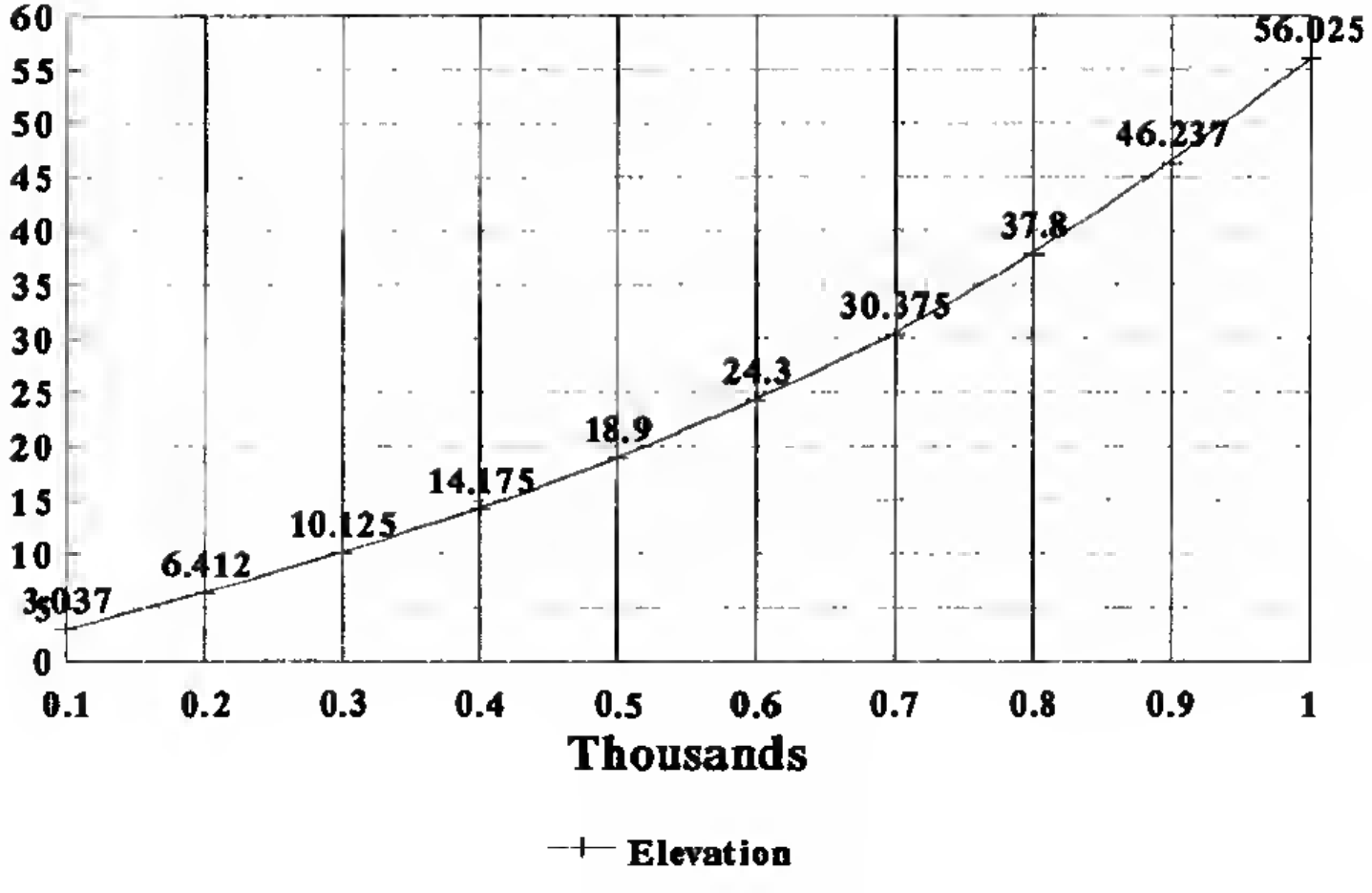

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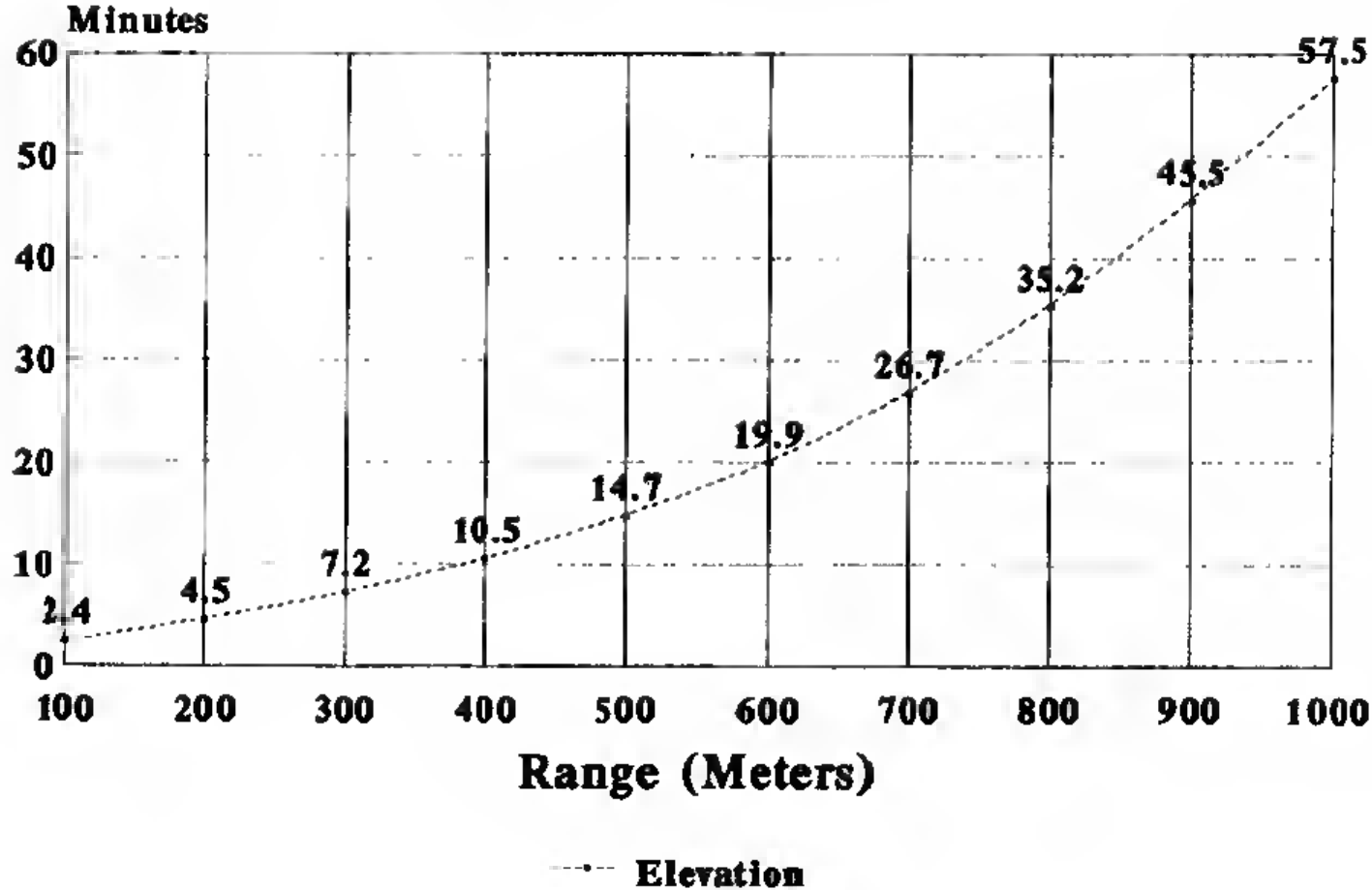

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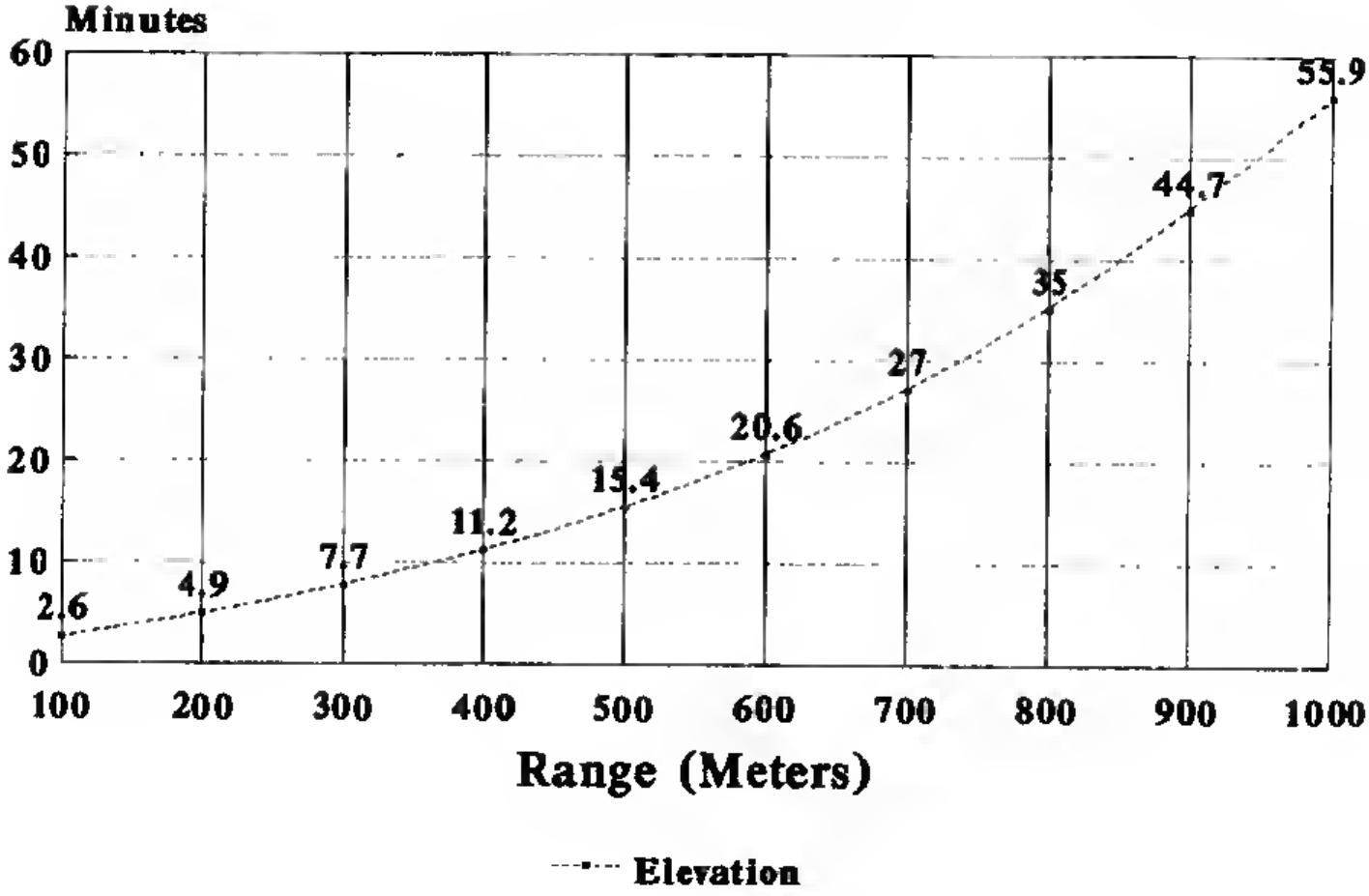

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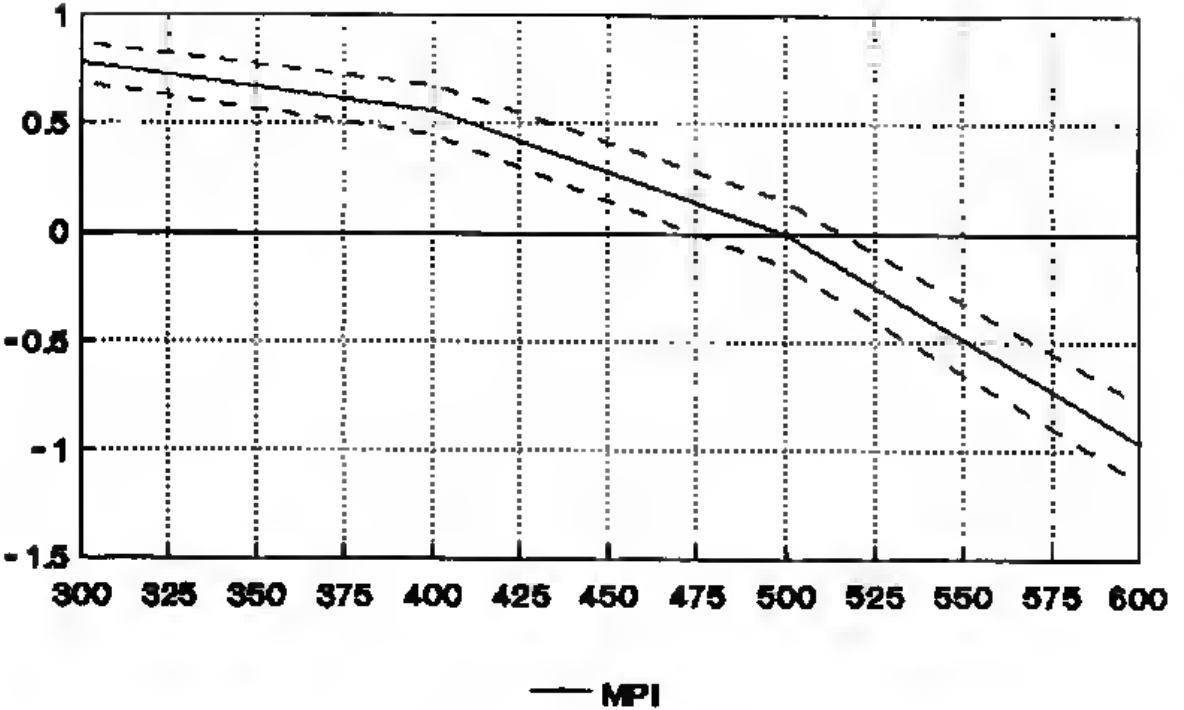

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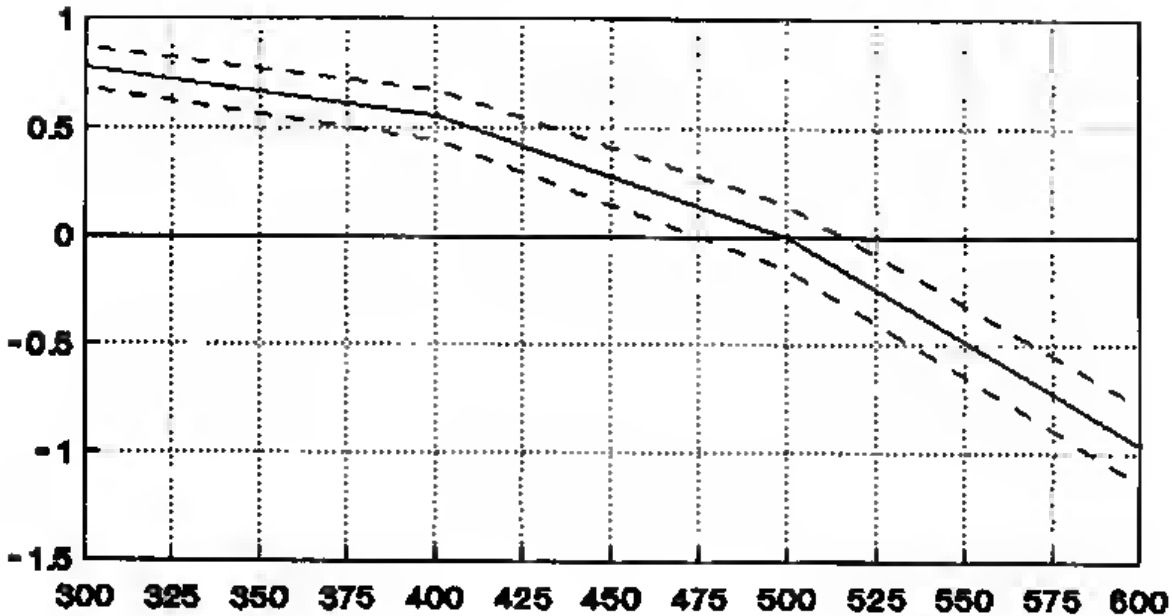
7.62mm M118



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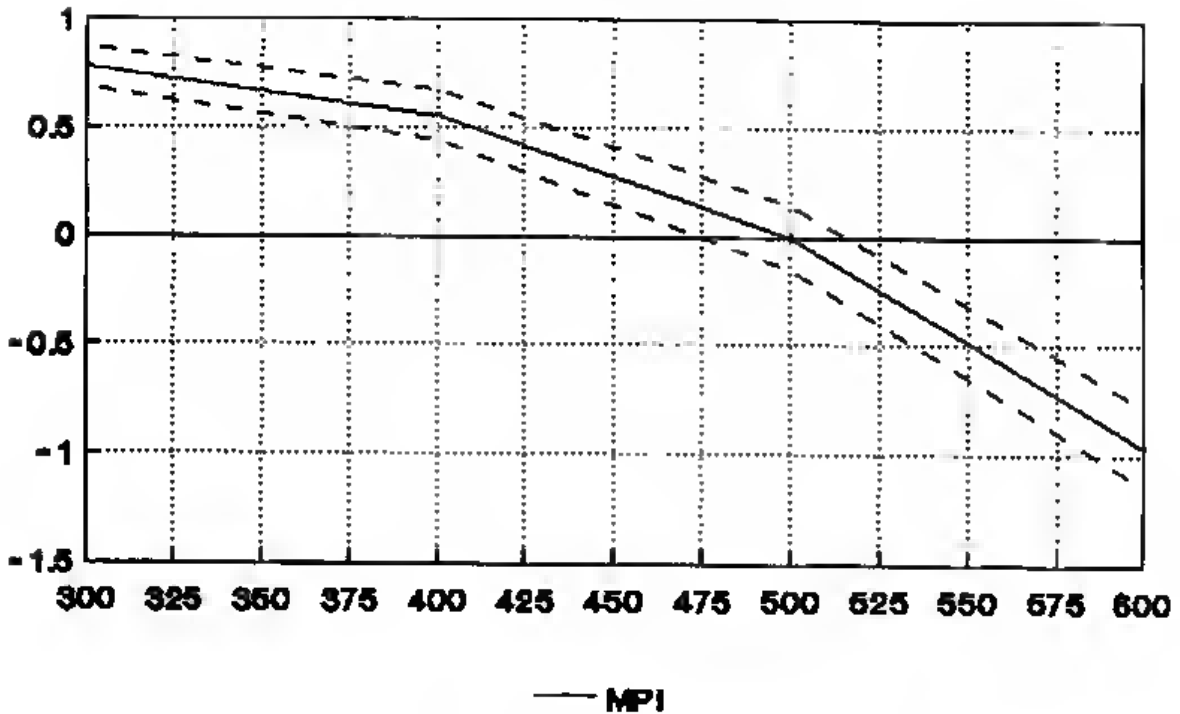

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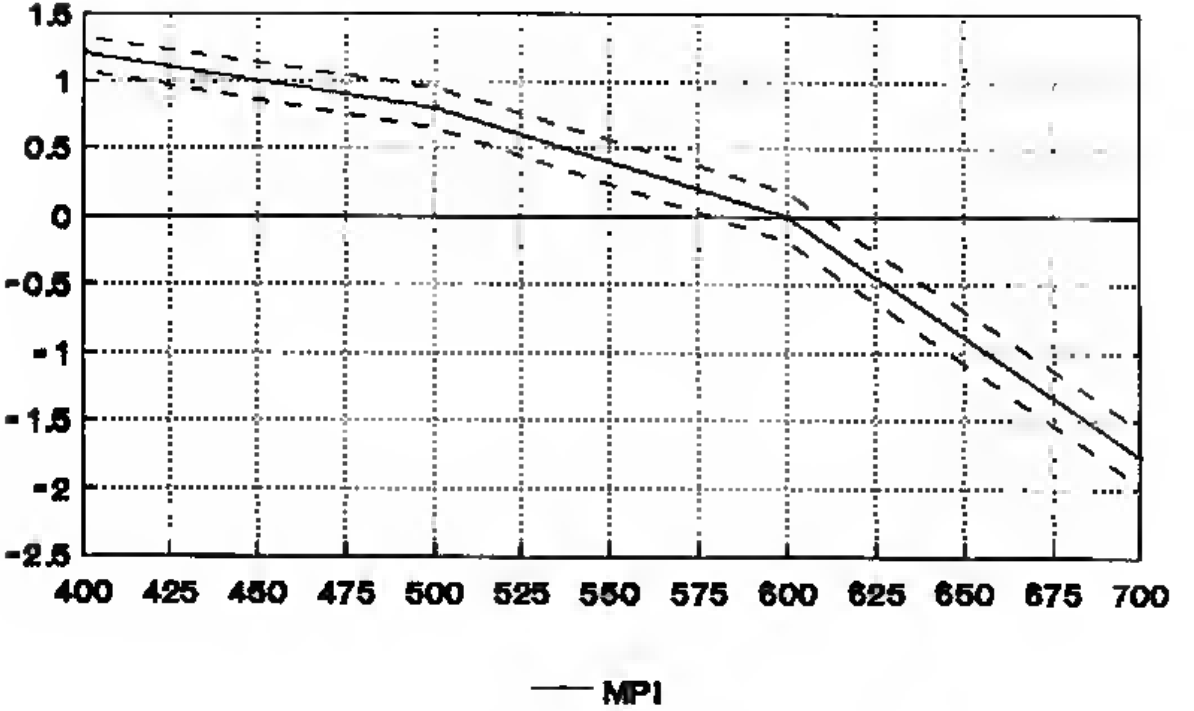
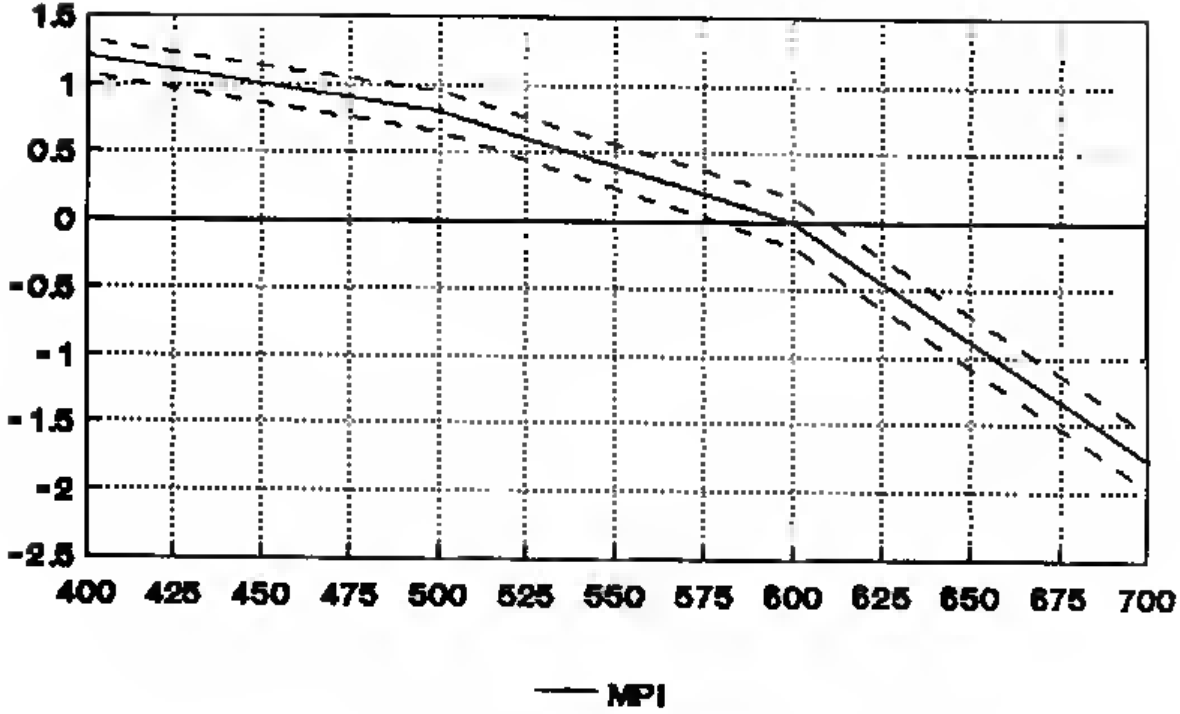


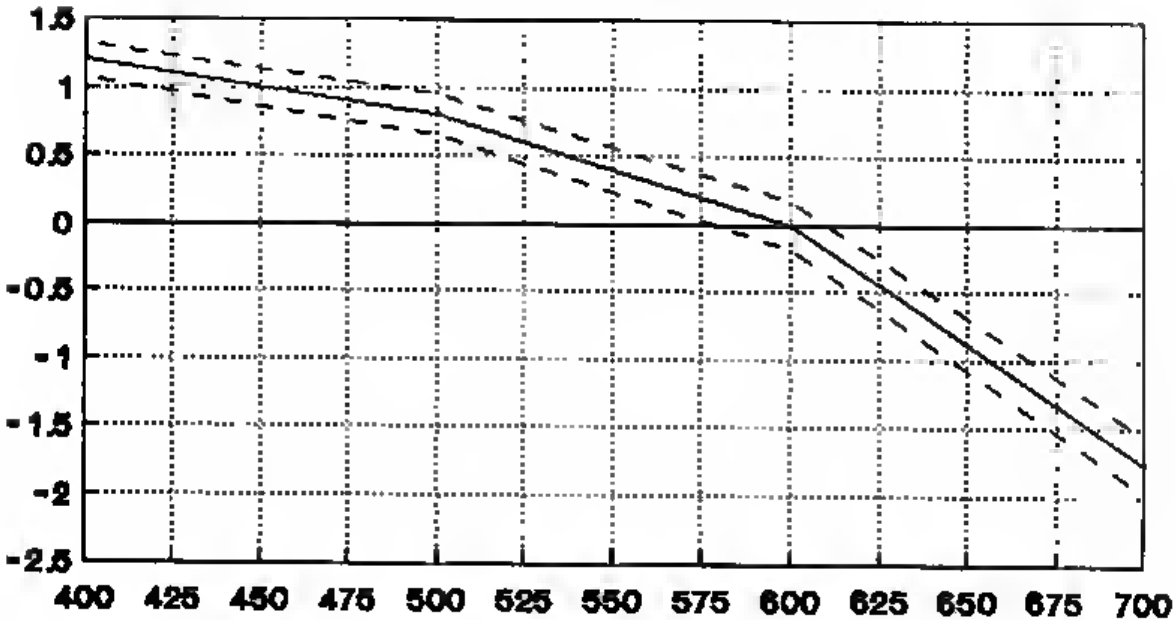
2 MOA Dispersion

600 Meter Danger Space
7.62mm M118



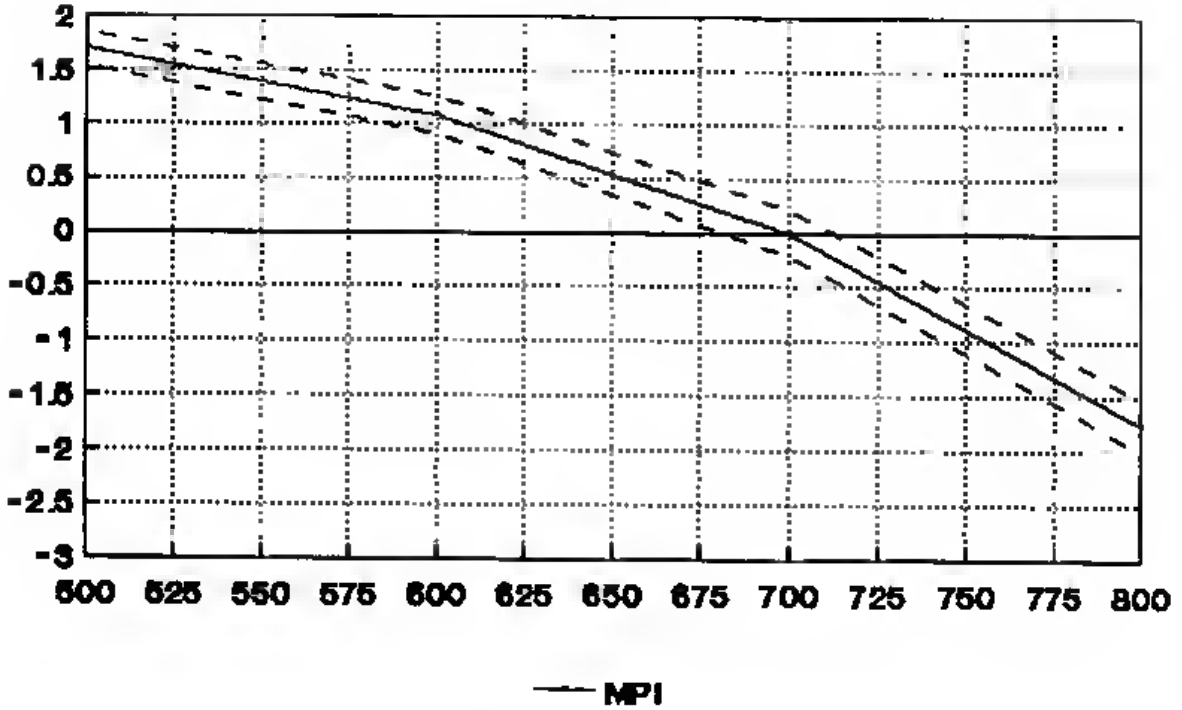
2 MOA Dispersion

600 Meter Danger Space
7.62mm M118



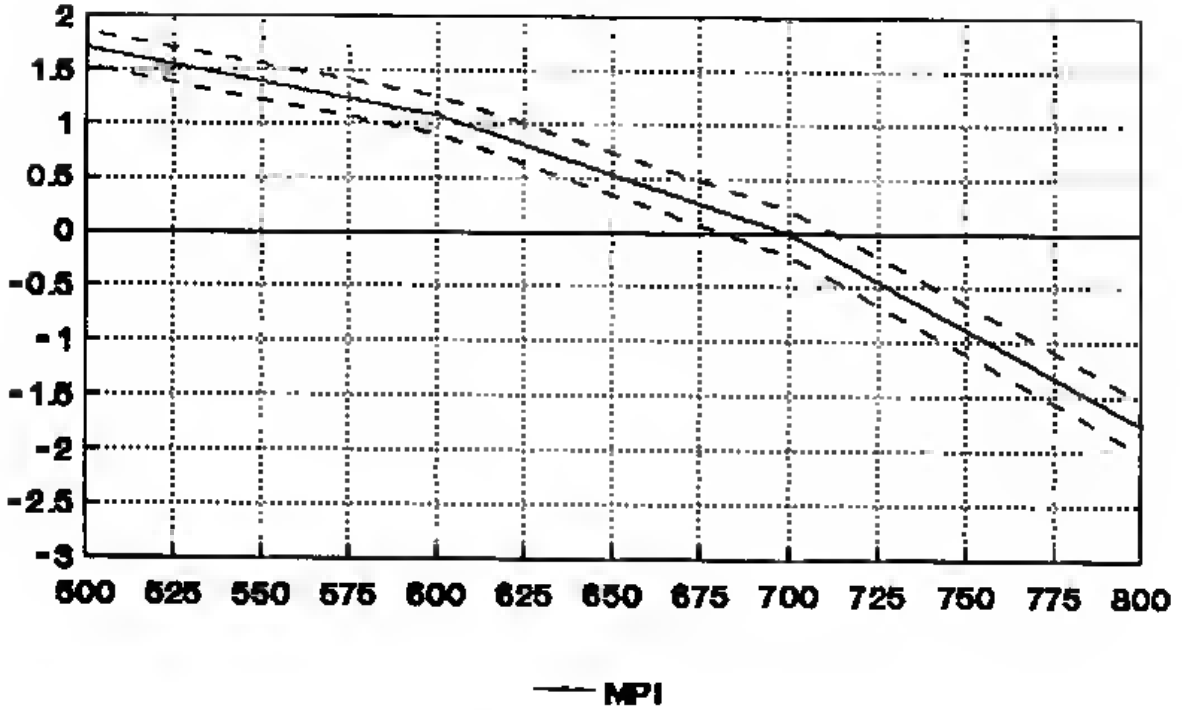
2 MOA Dispersion

700 Meter Danger Space
7.62mm M118



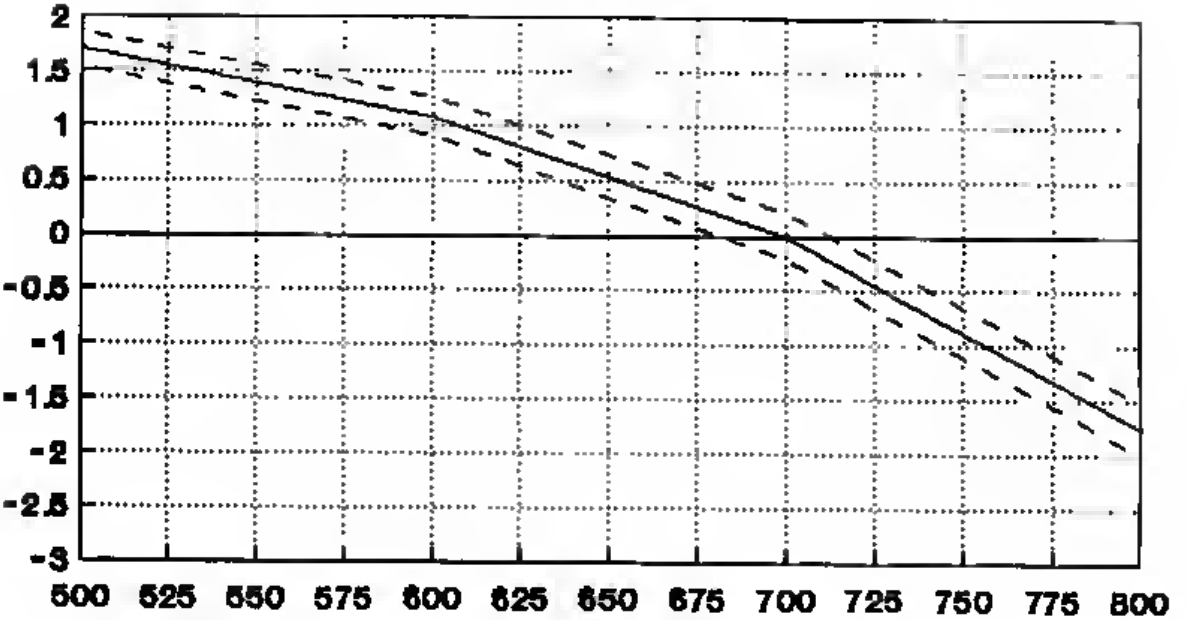
2 MOA Dispersion

700 Meter Danger Space
7.62mm M118



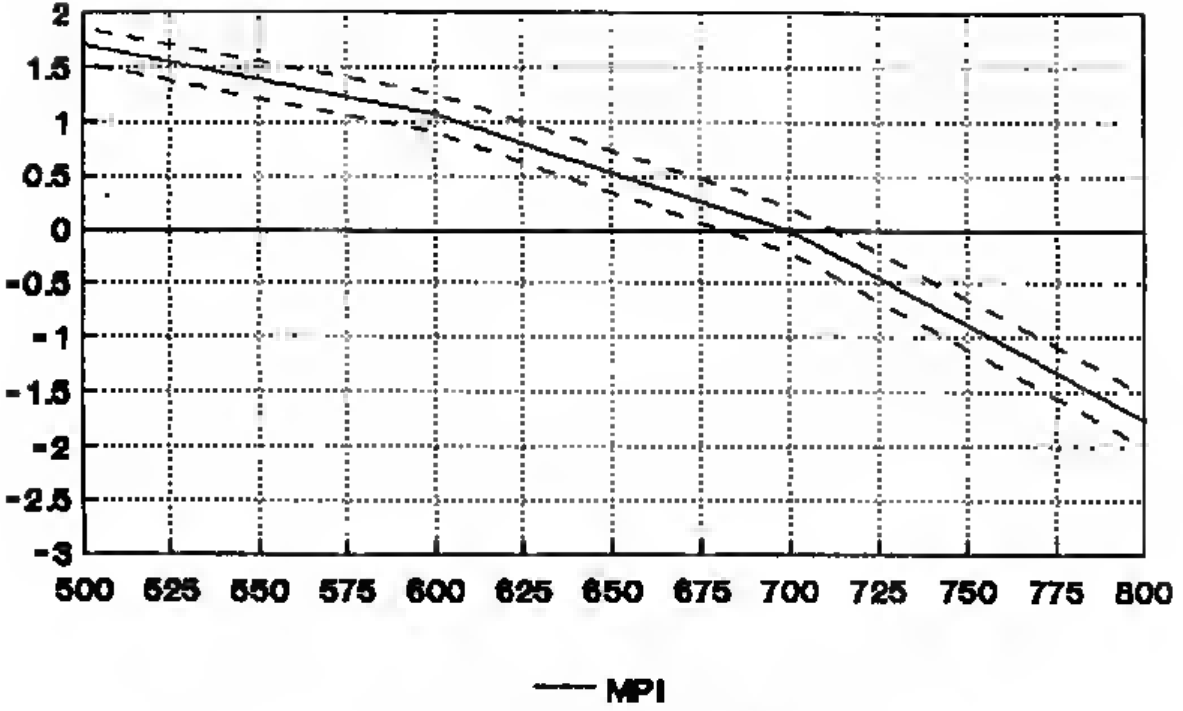
2 MOA Dispersion

700 Meter Danger Space
7.62mm M118



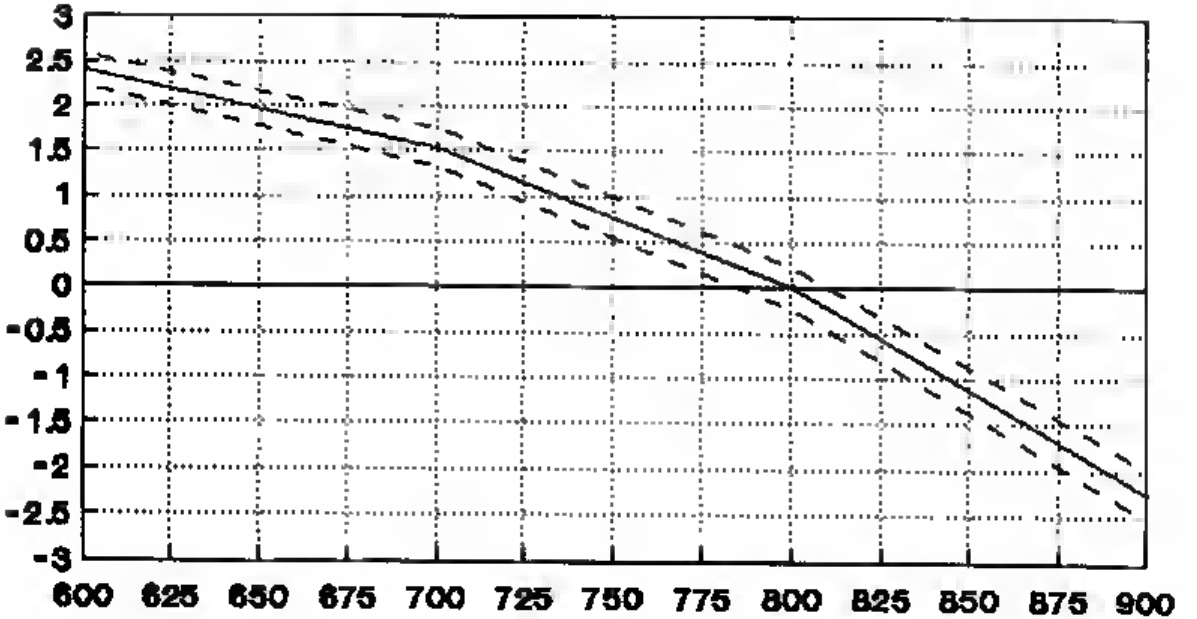
2 MOA Dispersion

700 Meter Danger Space
7.62mm M118



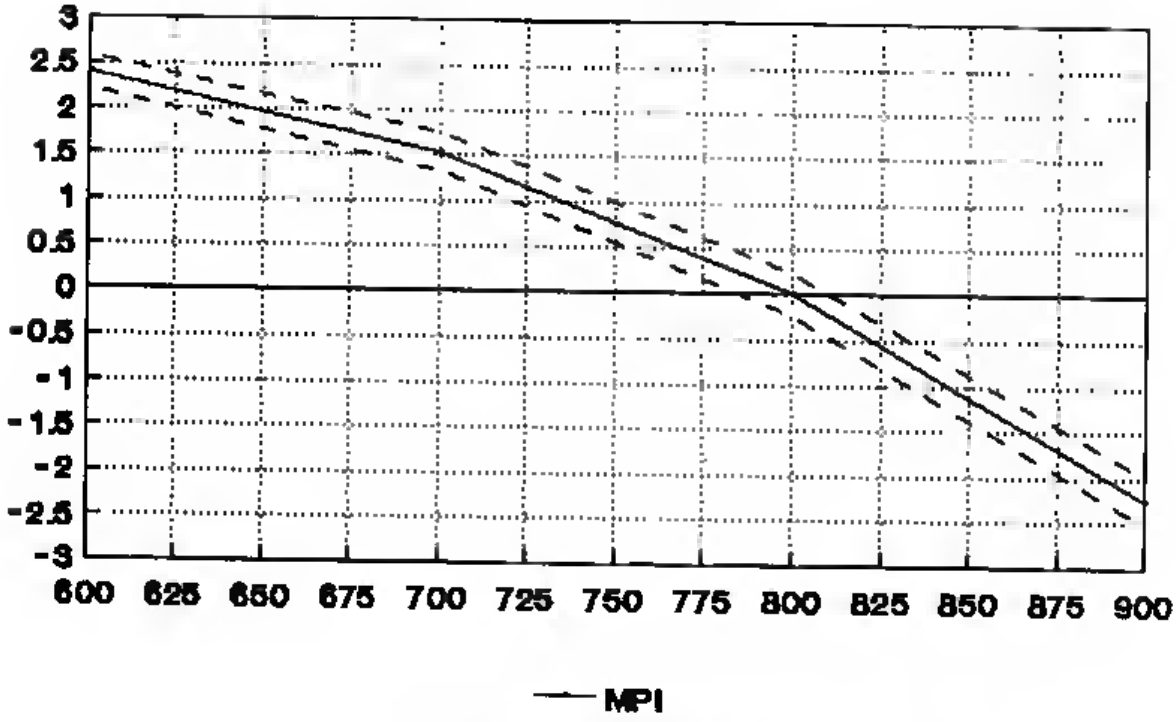
2 MOA Dispersion

800 Meter Danger Space
7.62mm M118



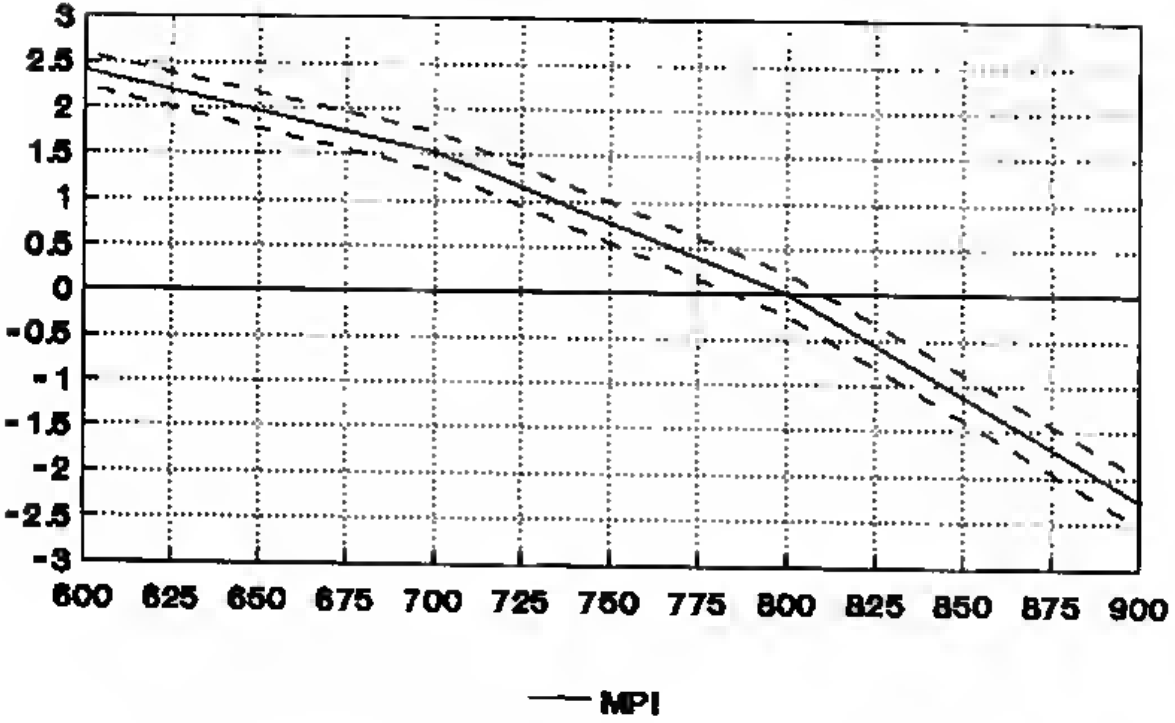
2 MOA Dispersion

800 Meter Danger Space
7.62mm M118



2 MOA Dispersion

800 Meter Danger Space
7.62mm M118



2 MOA Dispersion

900 Meter Danger Space
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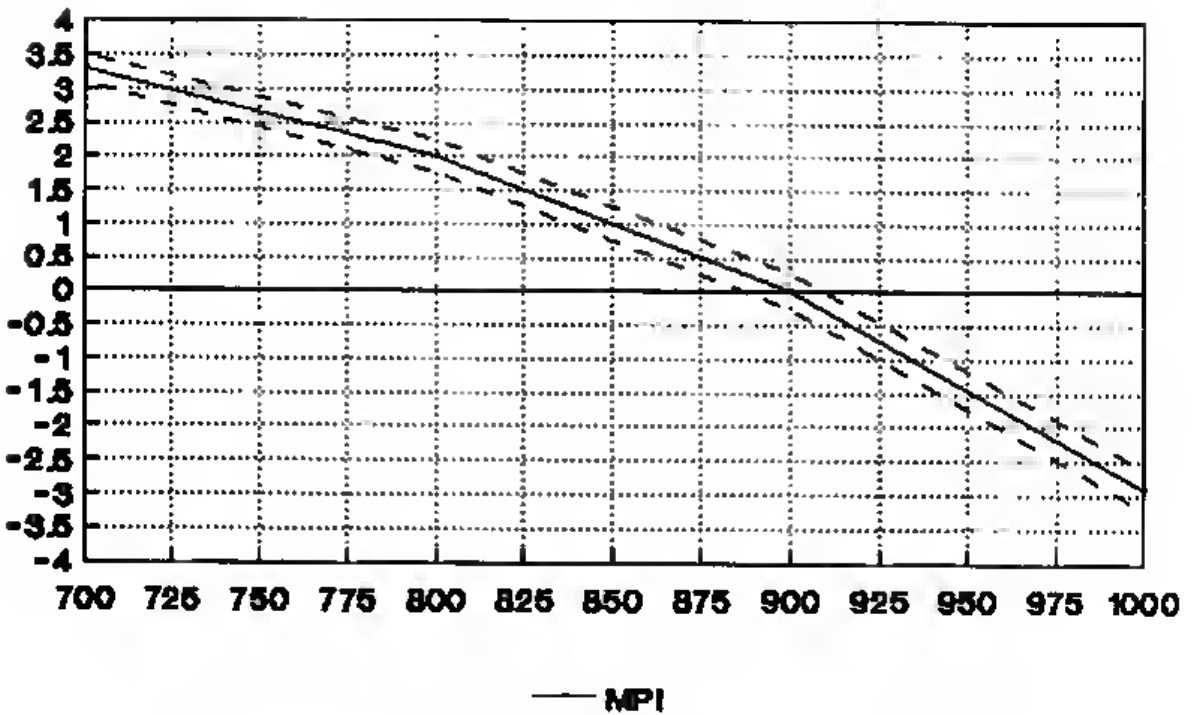
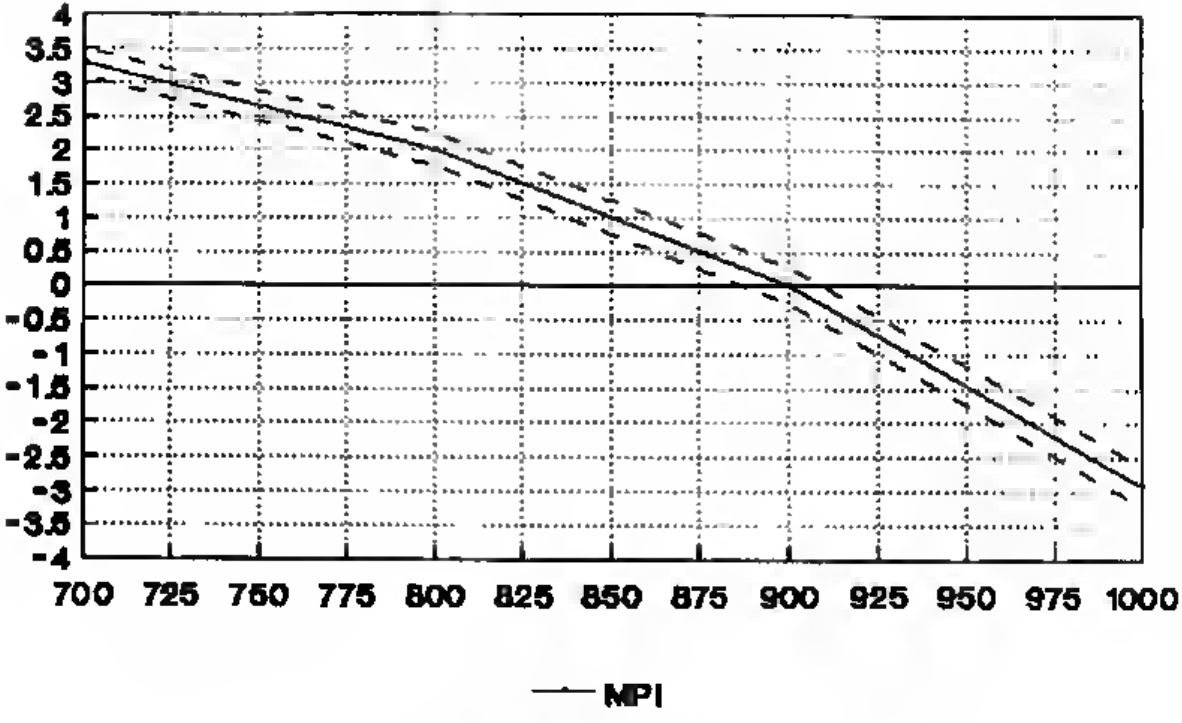


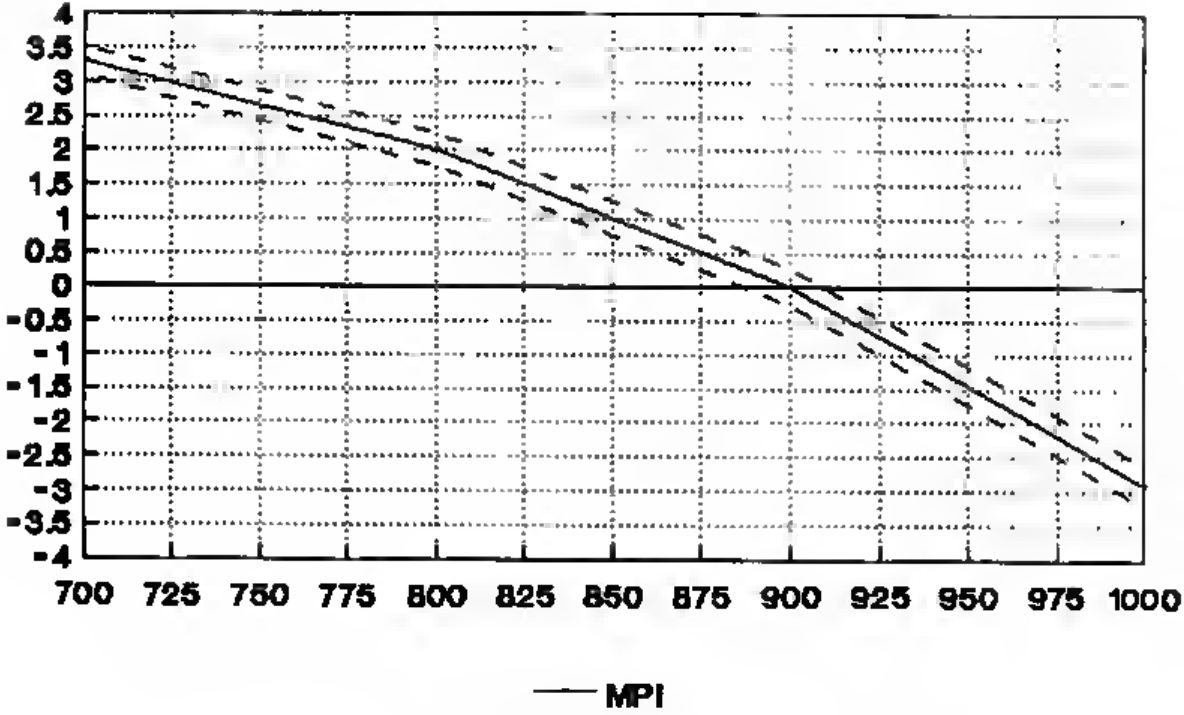
2 MOA Dispersion

900 Meter Danger Space
7.62mm M118



2 MOA Dispersion

900 Meter Danger Space
7.62mm M118



2 MOA Dispersion